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Coal Age

Volume 45 Number 2

Solid Progress in practically every department marked developments in coal in 1939. This is evidenced in the material in this, the 29th Annual Review and Progress Number of Coal Age. In making this statement, the editors acknowledge with sincere thanks the contributions of the many men who supplied material to complete this review . . . **Research activity** was not the least of the heartening developments for the coal industry last year. Improving established uses and developing new products naturally occupied the major part of the researchers' attention, but mining problems, such as roof support, gas ignitions, etc., were not neglected. For the 1939 picture, see p. 87 . . . **Maumee Collieries Co.** again comes to the front with a new preparation plant in Indiana employing both a new trough washer and an air-pulsated jig. Plant details and operation are the subject of an article scheduled for early publication. . . . **No crystal ball** is needed to reveal another good omen for the future of the bituminous industry. Advances in mechanical mining are definite and substantial—witness the wide-spread installation of loading

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29TH ANNUAL REVIEW AND PROGRESS NUMBER

COAL AGE (with which is consolidated "The Colliery Engineer" and "Mines and Minerals") is published monthly on the 1st. $3 per year in the United States, Canada, Mexico, Central and South America; other countries, $5 or 30 shillings. Single copies, 35 cents each. Entered as second-class matter Oct. 14, 1936, at the Post Office at Albany, N. Y., under the Act of March 3, 1879. Printed in the U. S. A. Cable address: "McGraw-hill, N. Y." Member A.B.P. Member A.B.C.

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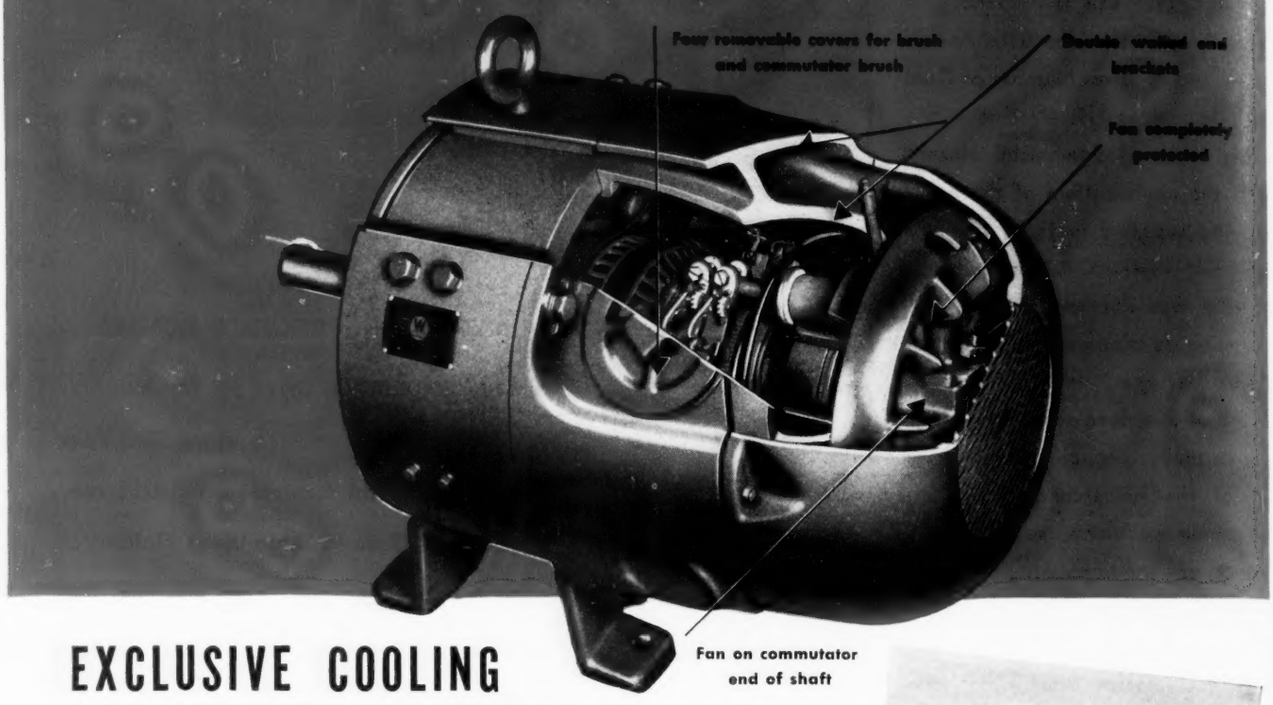

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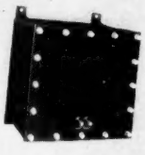

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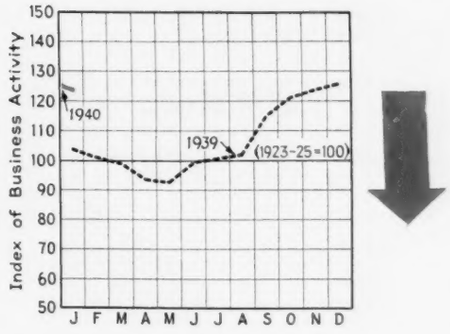
(CONTINUED FROM PAGE 5)

and conveying equipment detailed in the articles reviewing 1939 developments, p. 56; mechanization sales, p. 63; and progress in rubber-tired haulage, p. 60. . . . **With smoke elimination** more and more in the public eye, added interest accrues to the industry's latest project for supplying a smokeless fuel. This project, the "Solarite" plant of the Midwest Radiant Corporation, supplemented by a stripping and an up-to-date washing, screening and truck-loading plant, is the subject of three articles scheduled for early publication. . . . **Speaking of preparation,** 1939 was a banner year in this department in the bituminous industry, with mechanical cleaning registering new gains along with tipple construction. New theories and practices gave added impetus to coal drying, as detailed in the article beginning on p. 69. . . . **Shaft-bottom fans** already have been the subject of discussion in these pages. Now, Raymond Mancha details their advantages and answers a number of objections in a new treatise to appear in an early issue. . . . **The Coal Age front cover** this month features John L. Lewis, U.M.W. president, which has been considering its future course at its 50th anniversary meeting in Columbus. This cover has been released for editorial use through the courtesy of the Broderick & Bascom Rope Co., whose ad occupied this spot last February.

HOW'S BUSINESS

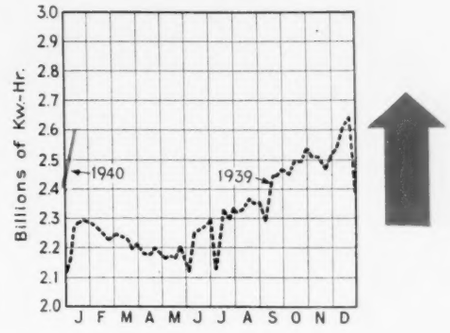
GENERAL BUSINESS ACTIVITIES

There has been a gradual ebb in business in the last few weeks, after a month of fairly steady activity. This probably is the usual reaction following the holidays. While such elements as the downward trend in the stock market are contributing to the smoothing off foreshadowed for the early months of the new year, the continuance of cold weather throughout the country is a favorable factor for the coal industry.



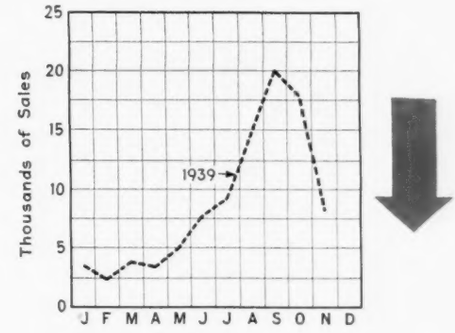
ELECTRICAL POWER OUTPUT

Continuing the upturn following the holidays, output by the electric light and power industry in the week ended Jan. 13 rose to 2,592,767,000 kw.-hr., an amount exceeded only in the two weeks preceding Christmas, according to the Edison Electric Institute. Compared with the corresponding period of last year, the gain, which has been gradually widening since early December, increased further to 14.2 per cent.



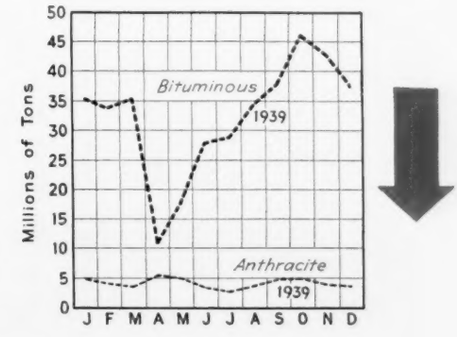
COAL-STOKER SALES

Mechanical-stoker sales in the United States in November last totaled 8,394 units (U. S. Bureau of the Census from 101 manufacturers), compared with 18,222 units in the preceding month and 7,917 in November, 1938. Sales of small units in November last were: Class 1 (under 61 lb. of coal per hour), 7,058 (bituminous, 6,058; anthracite, 1,000); Class 2 (61-100 lb. per hour), 639; Class 3 (101-300 lb. per hour), 431.



COAL PRODUCTION

Bituminous-coal production by United States mines in December last (preliminary figures), totaled 37,283,000 net tons, according to the Bituminous Coal Division, U. S. Department of the Interior. This compares with output of 42,835,000 tons in the preceding month and 36,541,000 tons in December, 1938. Anthracite tonnage in December last was 3,862,000 (preliminary), according to the U. S. Bureau of Mines, against 3,936,000 tons in the preceding month and 4,533,000 tons in December, 1938.



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DEVOTED TO THE OPERATING, TECHNICAL AND BUSINESS PROBLEMS OF THE COAL-MINING INDUSTRY

Coal Age

Established 1911—McGraw-Hill Publishing Co., Inc.
SYDNEY A. HALE, Editor • FEBRUARY, 1940

Pertinent and Impertinent

• ANY APPROACH to an uninterrupted flow in production results in dollars saved by the elimination of operating-time losses. That rubber-tired haulage represents another step in this avenue to lower costs is now fully proved. Savings under approximately similar physical conditions with this new-type equipment vary widely, as usual, with the degree of intensive management expended. After all, the proper coordination of men and machines for an uninterrupted flow of coal from face to railroad cars at the tipple is still the optimum.

• WHAT becomes of fine-size fuel values in unprocessed slurry is now answered almost like the child's query of what becomes of the white when the snow melts. That it disappears—and forever—is certain, but how much is recoverable and where it may be marketed are questions with which the industry seems too little concerned for its own bank roll.

• RUMOR is again abroad whispering that government-fixed minimum prices on bituminous coal are just around the corner. Maybe so. But the really important thing for both friends and foes of the Guffey act set-up to keep in mind is simply this: Washington can fix prices but it cannot deliver orders and no system of regulation can long protect the inefficient from the competition of efficient rivals.

• A JUBILANT United Mine Workers has been celebrating its fiftieth anniversary at Columbus, Ohio, the past month. And properly so. Congratulations are in order to any institution or organization which can survive the inevitable vicissitudes of a half century. Yet a word of admonition, too, might not be amiss. In their festive mood, Mr. Lewis and his followers should not forget that "the first hundred years are the hardest." Fifty down and fifty still to go.

• SMOKE ABATEMENT is a problem which cannot lightly be ignored if the coal industry is to avoid burdensome and possibly unfair restrictions in the continued sale of its output. Sulphur and carbon are valuable elements, but few people care to become involuntary consumers of them through breathing polluted air. Because the coal industry has more immediately at stake, it should take the initiative in a sane smoke-abatement program.

Postponed Repairs

"WE ENCOURAGED the men to refuse to drive any vehicle if they thought it was not in excellent condition," writes Ted N. Moyers in *Public Safety*. In how many mines would not a similar attitude result in greater safety? Too often management seems to expect the operative to handle a machine through the day even though in taking charge of it the operative finds, for example, an ineffective brake or some serious defect.

When a substitute takes hold, it is even worse. He, perhaps, does not recognize the weak link nor

does he know where along the road he must use caution or how many cars he can safely load on the locomotive. Foresight, good judgment and skill in employees are desirable, but it is far better to make the need for such qualities unnecessary, for at any time they may fail. With accident causes eliminated, the operative will have a no-accident day without undue mental effort.

Big and Little Falls

CLASSIFICATION of accidents has received further development at the hands of E. Rowley, inspector for the Midland and Southern Division of England. He reports that falls of five gross hundredweight (560 lb.) and under caused 60.2 per cent of the total accidents from falls; falls of five to ten gross hundredweight, 16.0 per cent; falls of ten to twenty gross hundredweight, 10.6 per cent; falls exceeding twenty gross hundredweight, 13.2 per cent.

Falls of only 560 lb. of material, Mr. Rowley argues, could be avoided by replacing posts and caps by posts and crossbars. "Many of the accidents," he declares, "might be avoided by incorporating the use of temporary props in the timbering rules instead of leaving the decision to the miner under the vague term of 'where necessary'." As every piece of roof has enough natural support to keep it from falling until the moment of its fall, it is certain that the additional sustaining power that would keep the weight in place as long as might be necessary would be much less than five hundredweight in the 60.2 per cent of the cases where falls of such weight or less occurred.

Some American mining companies now include temporary props in their systems of timbering. It is a procedure which all might study with profit.

Payment for Strikes

DOES FAILURE upon the part of an employer to accept willy nilly any proposal of a labor organization for continuing work pending the negotiation of a new agreement constitute a lockout? Mere statement of the question should furnish its own answer. Nevertheless, in two States, government agencies have ruled that miners who ceased work on April 1, 1939, are entitled to unemployment compensation for the period of the Appalachian suspension. In one case—Ohio—that decision has been sustained by the lower court. Virginia judges have held to the contrary in five cases and the West Virginia Department of Unemployment Compensation turned thumbs down on the miners' plea for such benefits.

Certainly at first blush assessing industry for payment under such circumstances seems absurd to the ordinary lay mind. If the doctrine enunciated in Ohio and Tennessee is sound, what shall be said if counter proposals for continuing work are made by the employers? Does the expiration of a wage contract give either party superior rights in dictating terms for avoiding a stoppage that involves no final dissolution of negotiations? The implications are so far reaching that no decision short of that handed down by a court of last resort should be accepted as final.

New Jobs for Coal

COAL in the past has found its largest outlets in heating and power uses. Although the use of coal as a raw material for the chemical industry is steadily growing, it seems likely that the older markets will still furnish the greatest outlets. Therefore, an increased demand for heat or energy may be the means of restimulating the coal-mining industry.

Among the uses which might be encouraged are: heating of main travel arteries, sidewalks, gutters and railroad switches to prevent the formation of ice; warming of garages to prevent damage to cars and to make travel in them in the morning more comfortable; heating of stadiums in frigid weather; heat-drying of farm products and, finally, more general use of electricity for air conditioning and irrigation.

There is nothing spectacular, it is true, in any of these suggestions. But their adoption in many cases must be preceded by a real public-relations job. That job is the molding of public opinion on the employment of heat as a direct and indirect means of providing greater comfort.

The Finch "Purge"

SUMMARY DECAPITATION of Dr. John W. Finch as head of the Bureau of Mines is not surprising—when the conditions under which he was appointed are recalled. His selection was a decided break with the tradition that chiefs of technical and scientific agencies should not change with a change in national administration. Dr. Finch was a beneficiary of that break; today he is a victim of the same system which gave him his office. Technical qualifications are not here in issue.

The system itself is vicious. As was pointed out at the time of his appointment (*Coal Age*, September, 1934, p. 335), "no technical bureau chief should be required to live under the shadow of the political ax" if worth-while service is to be rendered. The falling of the ax always raises ugly questions. In the present case, Secretary Ickes defends the decapitation on the ground that Dr. Finch "lacks iron in his veins" and was dominated by certain of his subordinates. These reasons, however, are too specious to satisfy those who see in this action further government kowtowing to a powerful labor organization and an outburst of Ickesian pique at the failure of the Bureau to campaign for the Neely mine-inspection bill supported by the U. M. W.

Charges such as these should not be permitted to die with an offhand press conference by the Secretary and a few brief words by the deposed head of the Bureau. They call for a Congressional investigation which will not only bring to light all the facts in the Ickes-Finch feud but which also will probe deeply into the effects of substituting political expediency and patronage for unhampered direction of essential governmental agencies. Otherwise some of these bureaus may cease to be essential.

WITH PRODUCTION UP

Coal Puts Pressure on Drive For Fair Share of Fuel and Energy Market

IN A YEAR marked by an increase in industrial activity on the one hand, warmer-than-normal weather on the other, a twelve-months-long struggle by federal agencies to establish minimum prices and marketing regulations and a six-weeks stoppage of work in the Appalachian region, the bituminous industry finally came through with a 12.6-per-cent increase in output. Realization, however, continued unsatisfactory. And, while much speculation as to its immediate and eventual effects followed the outbreak of war in Europe, it apparently had little effect on coal in the United States in 1939, either from the standpoint of internal demand or direct exports. In the main, the increased output reflected an improved demand for both capital and consumer goods, which was offset to some extent by another "warm" year. Only February, according to the U. S. Weather Bureau, could be classed as abnormally cold, while the other months either were moderately warm or far above ordinary seasonal temperatures.

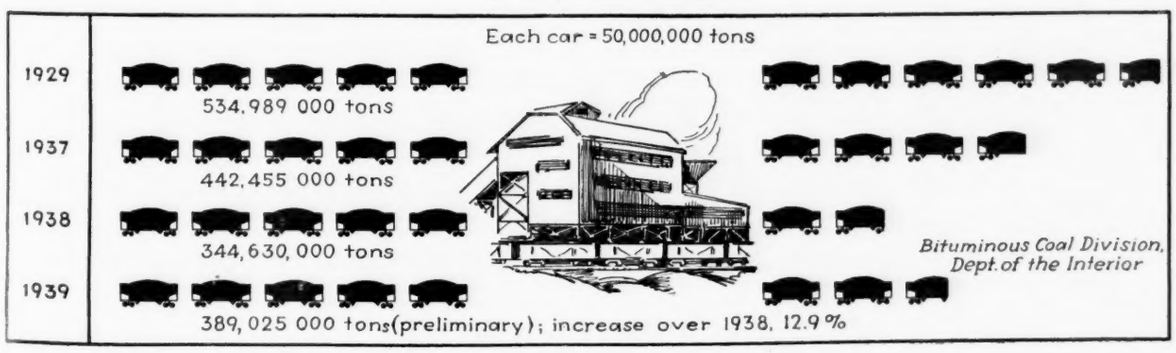
Credit for the higher output also goes to a more intensive market-promotion program by producers, distributors and allied equipment industries—reflected, among other things, in a substantial increase in stoker sales. Outstanding accomplishments in such promotional work are summarized in the article starting on p. 85. Coal also broadened its program of acquainting the public with its place in the country's economy and how unfair and subsidized competition adversely affect its ability to give employment and pay wages and taxes. At the same time, the industry continued its vigorous opposition to such competition—from both public and private sources—with some measure of success.

Total bituminous output in 1939, according to preliminary estimates by the Bituminous Coal Division of the Interior Department, was 389,025,000 net tons, an increase of 44,395,000 tons, or 12.6 per cent, over the 1938 total of 344,630,000 tons. Stocks in the hands of industrial consumers and retail dealers showed, on the whole, only nominal changes from 1938, while total lake shipments, cargo and fuel, rose to 41,123,608 tons, compared with 35,130,588 tons in the preceding year. Bituminous exports were perhaps 1,000,000 tons more in 1939.

Railroad-fuel consumption (Fig. 4) increased about 5,225,000 tons, or 8.9 per cent; electric-power-utility requirements rose some 3,906,000 tons, or 9.7 per cent. Figures for both groups include some anthracite tonnage. A sharp increase in pig-iron production boosted coal consumption for this purpose about 63.7 per cent, or 17,200,000 tons, in 1939. Consumption by steel and rolling mills, coal-gas retorts, cement mills, coke ovens (coal for coke for purposes other than pig-iron production) and "other industrials," on the basis of available data, increased about 6,900,000 tons, or 5.5 per cent.

Anthracite, less susceptible to fluctuations in industrial activity but more responsive to changes in weather, also finished up with a substantial gain. Production in 1939 is estimated by the U. S. Bureau of Mines (preliminary figures) at 50,807,000 net tons, an increase of 4,708,000 tons, or 10.2 per cent, over the 1938 total of 46,099,000 tons. Part of the increase is represented by an

Fig. 1—With industrial activity on the upgrade, bituminous coal output rises 12.6 per cent in 1939.



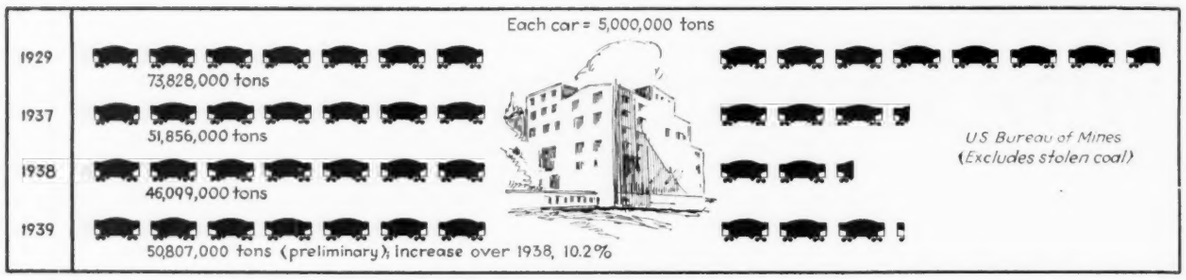


Fig. 2—Anthracite registers 10.2-per-cent gain in 1939.

addition of probably a million tons to the export total, mostly to Canada. Like bituminous, anthracite also faced stiff competition from competitive fuels in 1939. Warm weather, however, probably was a greater factor in limiting the industry's gains.

Continued opposition to federal competition and still more pressure on drives for measures designed to check unfair competition from oil (both domestic and imported), gas and imported coal marked the industry's relations with substitutes, while direct action centered in the promotional work of Anthracite Industries, Inc. This included consumer advertising and other promotional and good-will-building work, cooperation in the Anthracite Exhibit and the N. Y. World's Fair, the conduct of chimney tests to determine the basic facts with relation to domestic boilers, establishment of a dealer-training course in the installation, operation and servicing of domestic stokers, etc.

Anthracite Unsettled

Despite these activities, anthracite experienced a hectic year, largely because of price unsettlement growing out of various causes, chiefly excess producing capacity. On Jan. 19, 1939, the Glen Alden Coal Co. withdrew from the open-price filing agreement under which the industry had operated since Jan. 31, 1938, on the ground that the pact, because of lack of support, was not conducive to improved conditions. Subsequent withdrawal of other companies resulted in a decision to scrap the agreement Feb. 15 and substitute regional conferences for the discussion of production and marketing problems. As a result of price-cutting which followed abandonment of the plan, operators and miners, in a conference with Governor James of Pennsylvania, decided to inaugurate a 3-day week on March 6, at the same time adopting a system of filing all sales prices with the Anthracite Institute. By December, however, further decline in prices resulted in a voluntary move to sharply limit production to work down the stocks above ground. This move was successful enough to lead producers to raise mine prices about the middle of the month. And in January, 1940, following another price advance, it was announced that a plan of allocating tonnage among old-line and independent companies (60 per cent by line and 40 per cent by independents), with limitation of total output in accordance with potential market demand, had been drawn up and approved by all but 1 per cent of the industry and would go into effect following a conference with the Governor.

Dissatisfaction with the prevailing state of affairs resulted in a continuance of interest in stabilization proposals in 1939, usually based on legislative proposals. Prior to the first gubernatorial conference mentioned, operators, at a meeting in New York, adopted a long-range recovery plan embodying, among other things, the creation of a State Anthracite Commission with the power to regulate the industry through control of prices, production and marketing; and elimination of "bootlegging" by proper law enforcement. Early in April, eight hard-coal control measures went into the hopper of the Pennsylvania Legislature, and on May 17 the lower house passed the Kane bill providing, in addition to a regulatory commission, etc., for a research program but eliminating the setting of minimum prices. A tie vote in the Senate on May 28 resulted in defeat of the measure.

Independent anthracite producers embarked on a stabilization campaign of their own with the organization of the Anthracite Operators' Association on Aug. 11. On Aug. 31, the association authorized the formation of a joint committee of industry representatives and businessmen to conduct an investigation as a preliminary to stabilization measures. Later, the association applied to the Federal Trade Commission for permission to establish a code of fair-trade practices for anthracite.

Anthracite developments in 1939 also were marked by the conclusion of a new wage and working agreement with the United Mine Workers on May 27. The miners won a "union-shop" contract continuing the existing scale of wages and hours.

In the bituminous industry, a shutdown of six weeks (April 1 to May 13) occurred in the Appalachian region before a new agreement finally was arrived at. Negotiations started March 14, and by the end of the month both operators and miners had settled that the wage and hour provisions of the old agreement would be continued. The two sides parted company on union demands for a closed shop or elimination of the penalty clause. As a result, work in the Appalachian field was suspended April 1. In other districts, however, the mines continued to run under extensions of the old agreements until May 4 or 5, when they, too, suspended pending adoption of a pact for the Appalachian region.

Union Requests Granted

With the deadlock continuing, Department of Labor mediators moved in and President Roosevelt called the negotiating committee to Washington May 9. Finally, on May 13, eight Northern producers' associations granted the union request for recognition as the exclusive bargaining agency for the miners, desired by the United Mine Workers to enable it to stave off the thrusts of the rival Progressive Mine Workers, affiliated with the A. F. of L. The U.M.W. guaranteed the rights of management and consented to the retention of the penalty clauses in local contracts. Six of the thirteen Southern operators' associations, however, refused to accept the agreement, but all except Harlan changed their minds within a week and signed up. On

June 15, the Harlan association granted its members permission to enter into individual contracts, and on July 19 the association and the union finally composed their differences. With the Appalachian agreement signed, new contracts were executed in the outlying districts in jig time.

Halted in its tracks by court stays against price schedules promulgated late in 1937 and early in 1938 on the grounds that proper hearings had not been held, the National Bituminous Coal Commission suspended all prices on Feb. 26, 1938, and embarked on the wearisome task of preparing new schedules, including holding complete hearings. This work continued throughout 1939.

With all old schedules suspended early in 1938, new cost determinations were submitted by the district boards, along with marketing rules and regulations. This work got far enough along in 1938 for the National Bituminous Coal Commission to order commencement of coordination work in Districts 14 to 20 and 22 and 23. On Jan. 16, 1939, the Commission ordered coordination of prices and rules and regulations in Districts 1 to 8. On Feb. 20, an order was issued for coordination in Districts 9 to 13. And on Feb. 24, a supplementary order was issued for coordination in all market areas not covered in previous orders.

On March 20, the Commission, stating that coordination of prices had failed in all districts except 5, 14, 16, 18, 20 and 23 and coordination of rules and regulations in all districts except 14, 16, 18, 20 and 23, took over the work. Meantime, final hearings on cost determinations were started on March 6, coming to an end April 15. These were followed by reductions in approved costs in Minimum Price Areas 6, 7, 9 and 10 on May 1; 3, 4 and 5 on May 25; and 2 on June 6. Final hearings on marketing rules and regulations were held April 17 to 21, inclusive, and final rules and regulations were approved on May 25 to go into effect when minimum prices were established.

On May 9, the President, in his reorganization proposals, later approved by Congress, recommended abolishment of the National Bituminous Coal Commission and transfer of its functions to the Secretary of the Interior. This transfer took place July 1, at which time a Bituminous Coal Division was organized in the Department of the Interior with Howard A. Gray as director, D. H. Wheeler as assistant, and Percy Tetlow, former Commission chairman, as technical adviser.

Price Hearings Begin

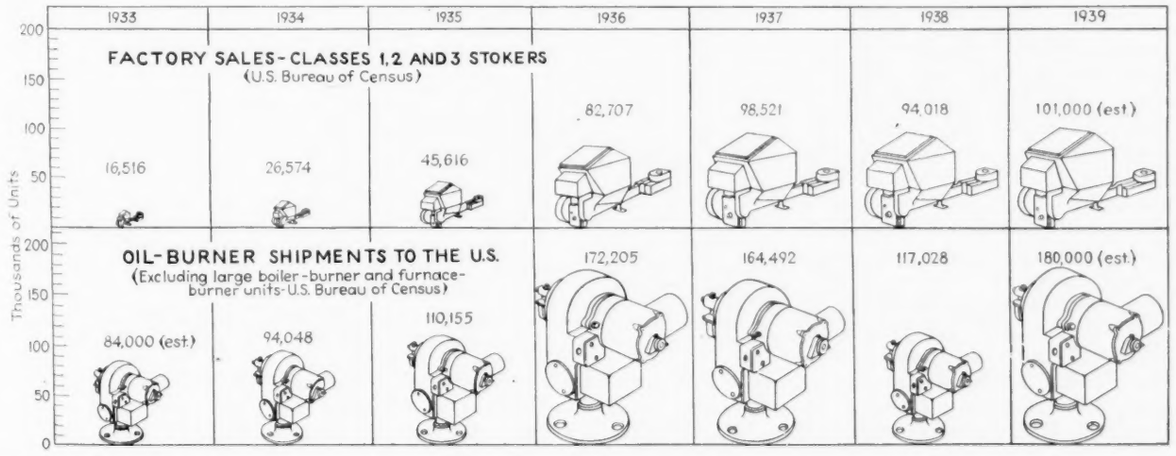
But before the Commission breathed its last, it approved coordinated minimum prices for Areas 7, 8, 9 and 10; Area 1, June 16; and Areas 2, 3, 4 and 5, June 24, all such prices subject to final hearings. These hearings began in Washington July 24, covering prices for Districts 1 to 20, inclusive, and also 22 and 23, the Denver part of the hearings being transferred to the capital. The Division completed presentation of evidence to support its proposed coordinated minimum prices on Nov. 22. District boards started presenting their protests Nov. 24, while individual producer protests began Dec. 11, continuing into 1940. Meantime, hearings on discounts to distributors and rules and regulations for the maintenance of prices in the resale of coal started Nov. 27 and ended Dec. 5.

Suspension of the price schedules in 1938 was felt keenly by many producers, and proceedings since that time have been punctuated by appeals from various groups for more speed. On the other hand, the price débâcle strengthened opposition among other producer groups against either parts or the entire act. This opposition was evidenced in one direction by the organization Feb. 10, 1939, of the Committee for the Amendment of the Coal Act, with John A. Howe, vice-president, Truax-Traer Coal Co., as chairman. On March 20, Representative Allen, Pennsylvania, introduced in the House a bill to modify the Bituminous Coal Act. A revised bill was offered May 15. The Allen proposals were supported by the Committee for the Amendment of the Coal Act, but no action was taken on them during 1939.

One attack on the constitutionality of the Guffey-Vinson Act, by the City of Atlanta, reached the Supreme Court in 1939. The city first lost out in a decision by the District of Columbia Court of Appeals on Feb. 16 upholding the act. On May 2, the Supreme Court agreed to receive an appeal, and on Nov. 13 ruled that the city could not maintain an action because prices had not been put into effect and therefore it had suffered no damage.

Establishment of marketing agencies continued in 1939, largely as a result of the delay in the establishment of minimum prices. Agencies approved in 1938 were the Kentucky Coal Agency, Southern Illinois Coals, Inc., and Middle States Fuels. Agen-

Fig. 3—Small stokers register higher percentage gain than oil burners in 1939.



cies approved in 1939 were the Western Pennsylvania Coal Corporation, Fairmont Coals, Inc.; Arkansas-Oklahoma Smokeless Coals, Inc.; Southwest Coal Corporation, Upper Buchanan Smokeless Coals, Inc., and Belleville Fuels, Inc. And on Oct. 16, 1939, a hearing was held on the application of Brazil Block Fuels, Inc.

Competition continued as the biggest factor in the bituminous picture in 1939. On the basis of eleven months' figures by the U. S. Bureau of Mines, consumption of gas oil, distillate fuels and residual fuel oils totaled 450,000,000 bbl. in 1939, an increase of 10 per cent over the 1938 figure of 409,124,000 bbl. Of these totals, approximately two-thirds was absorbed for heating, railroad use, bunkering and gas and electric-power production, including approximately 100,000,000 bbl. consumed by domestic oil burners, of which 1,860,000 were estimated to be in operation at the end of the year.

Stoker Sales Rise

The above domestic-burner total reflects the fact that burner shipments (domestic and commercial, excluding large boiler-burner and furnace-burner units), after a decline in 1938, rebounded to an estimated total of 180,000 in 1939, an increase of 5.4 per cent over the 1938 shipments of 117,028 reported by the U. S. Bureau of the Census. The 1939 shipments, incidentally, were the highest in the history of the industry. On the other hand, factory sales of Classes 1, 2 and 3 stokers (domestic, commercial, etc., up to 300 lb. per hour) staged a 7.4-per-cent increase in 1939 to an estimated total of 101,000, compared with 94,018 in 1938. The 1939 total includes some 11,000 small residential stokers burning anthracite, as compared with 12,651 in 1938.

Consumption of oil, gasoline and diesel fuel for yard and road-train service by Class 1 railroads (Fig. 4) increased about 6.9 per cent in 1939; coal consumption rose 8.9 per cent. Electric-utility oil consumption was marked by a major increase of 30.4 per cent in 1939, while natural-gas consumption rose 12 per cent. Coal, however, lagged behind with a 9.7-per-cent increase in consumption.

Total natural-gas consumption in the United States, on the basis of sales reported to the American Gas Association, increased approximately 10 per cent in 1939, and number of customers rose 3 per cent. Domestic and house-heating sales were up 6.7 per cent; commercial, 9.5 per cent; and industrial, excluding electric power generation, 11.2 per cent. In order of volume, industrial sales were 50 per cent of the total in 1939, with domestic and house-heating sales running about 27½ per cent. Manufactured-gas sales, as compared with natural gas, increased 4 per cent in 1939, with house heating leading the list with a 15.9-per-cent rise.

Although proposals for federal hydro-power projects still were numerous and required constant attention from the industry, the number to gain final approval in 1939 was small. However, proponents of these projects remained active, and among the major proposals carried over into 1940 is the so-called "St. Lawrence Seaway." A revised form of the treaty with Canada on which the project is contingent is expected to reach the Senate during the present Congressional session. And developments in the field of competition were marked by a Presidential message to Congress Feb. 16 urging consideration of methods of conserving and utilizing the nation's energy sources. An accompanying report from the National Resources Committee stated that the obvious remedies lie in increasing recovery of fuels, promoting economy in their use, and "in placing a larger share of the energy burden on lower-grade fuels and water power."

But placing "the energy burden . . . on water power" proved somewhat difficult of accomplishment in the case of TVA in 1939. The Authority on Jan. 30 won out against fourteen Southern utility companies when the Supreme Court, without passing upon the constitutionality of the TVA act or the Authority's actions, dismissed the utilities' case on the grounds that they were not suffering illegal competition, that TVA operation did not constitute an illegal form of federal regulation of local utilities, that sale of government property in competition with others does not violate the Constitution, and that TVA did not engage in illegal coercion, duress, fraud or misrepresentation.

On Feb. 4, TVA agreed to purchase the electric-power properties of the Tennesse Electric Power Corporation for $78,600,000, and on April 3 the Authority was absolved of wrongdoing by the majority of a joint Congressional committee which had spent nine months investigating its activities. However, TVA's request for authority to issue bonds for the purchase of Tennessee Electric Power and other private utility properties met with a grudging reception and finally the total was severely cut, in addition to restrictions as to how the funds were to be used. And with intensification of the 1939 drought, TVA started buying coal to operate steam plants which it had taken over to make up for deficiencies in water supply. Contracts for 60,000 tons of Kentucky coal were let for the Nashville steam plant in August, followed later by the purchase of 57,000 tons of Alabama and Tennessee coal for this and other generating stations.

Competition Continues

With no recession in competitive pressure, the bituminous industry intensified its counter-measures in 1939. In addition to taking its story directly to the public, and to an advertising campaign built around automatic coal heat (see p. 85), the industry actively opposed detrimental proposals before numerous Congressional committees and federal agencies and also went out on the firing line to combat the use of competitive fuels. One setback was the adoption of a trade agreement with Venezuela under which the tariff on oil imports from that country was cut from 21 to 10½¢ per barrel, resulting in an intensification of the industry's efforts to prevent renewal of the Presidential power to make reciprocal trade agreements. The National Coal Association and individual operators and operator groups also actively opposed requests to the Federal Power Commission for permission to build new natural-gas lines, such as from Montana to the Dakotas, Kansas to the Mesabi Range, Kentucky to Indiana, etc.

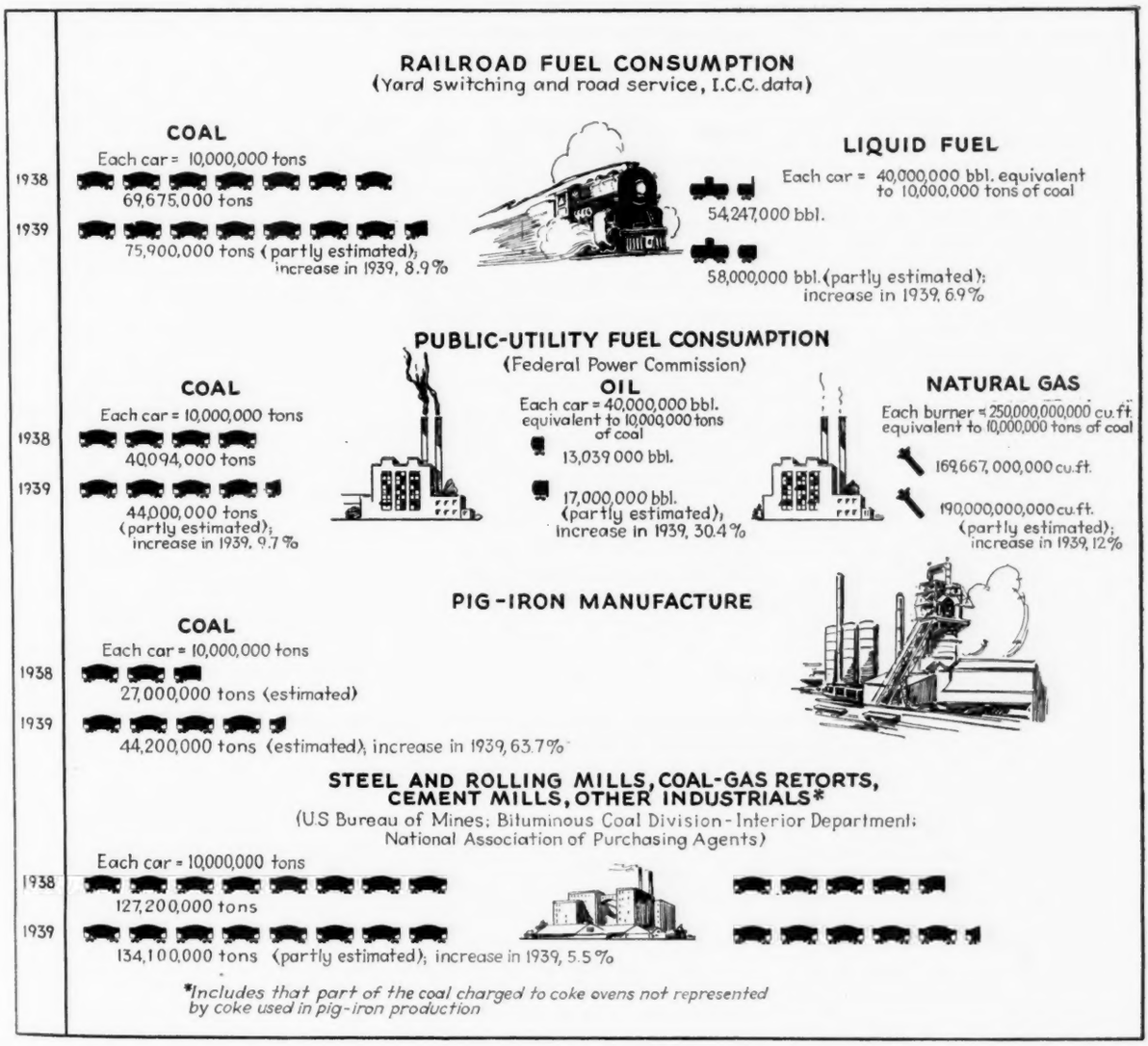
Numerous presentations in behalf of coal were made to governmental agencies, State agencies and municipalities and private consumers in 1939, including, as examples, the Federal Housing Administration, Veterans' Administration, the War Department, and the city of Buffalo. In the latter case, bituminous representatives were able to keep a proposed $2,000,000 public auditorium in the coal-burning ranks. And through the industry's efforts, coal was selected as the fuel in several housing projects, federal hospitals, army posts, and other federal properties.

Major progress toward reinstatement of an industry-wide research program was made in 1939, in which year the industry also took various other steps to insure complete satisfaction with bituminous coal. At the same time, the problem of smoke control moved much farther into the limelight. A new three-year research program for Bituminous Coal Research, Inc., was charted at a meeting March 21, including development of methods and equipment for complete automatic heating of residences and buildings with a wide range of coals, ceramic and metallurgical heating and melting with pulverized coals, complete gasification of coal, a coal-dust engine, and collection and handling of ash without detrimental slagging, clinkering or discharge into the atmosphere. Plans were then laid for securing the necessary funds of $235,000 a year, and by November, 58 per cent of the funds required to permit a start in 1940 had been pledged.

Growing clamor against air pollution in a number of cities over the country focused greatly increased attention on this problem in 1939. St. Louis, in particular, was the scene of agitation for control of smoke, which culminated at the end of the year in serious consideration of a plan to build a municipal plant to supply smokeless fuel. Similar proposals also were made in Nashville, Tenn. Meanwhile, the Midwest Radiant Corporation completed a carbonizing plant at Millstadt, Ill., for the production of "Solarite" smokeless fuel from St. Clair County (Ill.) No. 6 coal. This plant serves St. Louis and supplements the company's original "Carbonite" plant at West Frankfort, Ill.. During the year, the Chicago, Wilmington & Franklin Coal Co. carried on experiments at West Frankfort with the Wallace low-temperature carbonization process to produce a smokeless fuel from rescreener dust.

With the biggest stake in the St. Louis market, and with the smoke-control problem increasing in its own communities, Illinois last year took steps to ascertain the possibility of processing its coals to make them smokeless. These steps culminated in a bill to appropriate $300,000 for a smokeless-coal study by the Illinois Geological Survey, offered in the Illinois Legislature in April. The bill was passed and signed in July, although the appropriation was cut to $180,000. However, work on the construction of a laboratory, and on equipment to produce smokeless briquets, it was announced, would start at once.

Fig. 4—The coal picture, compared with competitive fuels, in certain industries in 1939.



ANTHRACITE INDUSTRY

With Prospects of Renewed Vigor Rises From the Ashes of Near Bankruptcy

Despite a year of discouragement relieved only toward its end—and by a recovery not expected to be permanent—the anthracite region made some important developments, especially in breaker construction. That the life of the anthracite industry will extend beyond the sour anticipations of earlier prognosticators seems assured by the working today of thin seams with the aid of machinery, despite irregularities in seam thickness and folding. Refinements in cleaning processes still continue.

BANKRUPTCY retrenchment and reorganization marked the year 1939, but out of the welter probably will eventually come development, for discordant elements are drawing together and seeking some *modus vivendi* that will enable the business to continue on a safe and sane basis. For the present, at least, it seems no longer to be the football of unfriendly politicians hungry for votes. The collapse of the Philadelphia & Reading Coal & Iron Co., though not unexpected, has filled everyone with consternation.

Leading among the changes of the year were the opening of the Huber breaker of the Glen Alden Coal Co., the readjustments in the Hazleton shaft of the Lehigh Valley Coal Co. and the erection of the Hammond breaker by the newly constituted Hammond Coal Co. at Girardville, which takes over a property once mined by the Philadelphia & Reading.

In the issue of a year ago, the Huber breaker received preliminary mention (*Coal Age*, February, 1939, p. 43), but not until Feb. 1 did the mine and breaker begin delivering coal. The outstanding features of the latter are the use of Menzies cone separators, one cone to a size; the absence of bins for the larger sizes, because egg to chestnut are boom-delivered to the railroad cars; the division of the breaker into two halves for separate or combined operation, the use of silos for the supply of fine coal to be used in the boiler plant, the tinting of the coal with an insoluble and adherent blue coloring imposed by a chemical process, and the large tonnage—at least 7,000 tons daily if not more. Also may well be noted the modernized housing of the breaker with its acres of glass (*Coal Age*, April, 1939, p. 68).

Hardly attributable to the past year is the big Huber power house of that breaker, which uses $\frac{3}{32}$- to $\frac{1}{32}$-in. coal and generates steam at 600 lb. per square inch and a steam temperature of 632 deg. F., thus exceeding anything installed as yet at any colliery power house (*Coal Age*, May, 1939, p. 37). However, if the Huber power house cannot be described as a 1939 installation, the initial operation of the big refuse dump equipment may rightly be ascribed to last year. Its 22 four-wheeled panlike carriers cross 27 railroad tracks and carry mine and breaker rock to a tower where it is fed in measured quantity to one of two tramcar buckets which carry it to the dumping ground, where it falls on the top of one of two dumps each with a capacity of 40,000,000 cu.ft., though if tail towers are to be buried the total capacity of the dump will be 123,000,000 cu.ft. (*Coal Age*, August, 1939, p. 32). With 200 days' operation per year and with 1,000 tons of rock for disposal per day, the dump should supply enough disposal space for 30 years.

Desiring to increase the tonnage at the Hazleton shaft, the Lehigh Valley Coal Co. made extensive improvements which concentrated all hoisting operations at the shaft, eliminating the slopes, strippings and coal banks by which in part it was formerly fed. To this end, the tonnage hoisted through the shaft had to be quadrupled. Fortunately, the shaft had been sunk in the days when water hoisting was regarded with much favor and was indeed probably an improvement on all the other means of lifting water then available.

In consequence, in the shaft were two compartments for hoisting coal and two for hoisting water. The latter were no longer in use. All that was needed was to lower the shaft bottom to the Third Level, but, as the shaft was working, it was thought better to start at the Third Level and drive a vertical raise from that level to the one above. Many long rock tunnels connecting the two sides of the basin also were constructed and a bottom was provided that would permit of the hoisting of 4,500 tons daily. A car-transfer truck, two car feeders, two trip makers and four cagers, all automatic, with room for

45 loads and 45 empties on one side of the shaft and 68 loads and an equal number of empties on the other side, made this possible (*Coal Age*, November, 1939, p. 55). Work was finished early in the year.

Near the close of 1938, the Pittston Co., which was restricting its operations, leased Pittston No. 9 colliery to the Anthracite Coal Co. This concern decided to rebuild the breaker. The name of the company was changed later to the No. 9 Coal Co. Menzies cones were installed, and, as it was necessary to provide a cone for each size, if the desired tonnage was to be cleaned, that arrangement was adopted, except that barley and No. 4 buckwheat are cleaned together.

Ample trackage is provided for the blending of coals from various sections of the mine and a diversion on the main conveyor makes it possible to direct the coal, if desired, unsized and uncleaned, to railroad cars for storage purposes. It can then be dumped at some convenient time in the receiving hopper for screening and cleaning in the breaker. A large recovery tank at the level of the cones and under the sizing shakers takes the water from these screens, thus providing make-up water, reducing water lift and assuring that the cones will start cleaning promptly as soon as pumps begin to turn impellers (*Coal Age*, January, 1940, p. 58).

The Hammond Coal Co. erected last year, in place of the old Hammond breaker, formerly operated by the Philadelphia & Reading Coal & Iron Co., at Girardville, a large preparation plant. Chance flotation equipment with a capacity of 250 tons of feed per hour and Wilmot Hydrotators and hydroseparators with a capacity of 220 tons are to be used for cleaning. The Hammond company has also repaired the mine and put it in operation.

At West Shenandoah, the Weston breaker, which has the new du Pont sink-and-float process, has been remodeled, and the Monitor Co., Inc., has erected a 200-ton-per-hour plant at a coal bank using Chance cones for buckwheat and larger, one of the new du Pont classifiers for rice and barley and another for No. 4 and No. 5 sizes. The Lehigh Navigation Coal Co. also has been using the du Pont classifier.

Completing work at the foot of the Hazleton shaft after its raising from the Third Level

East Bear Ridge colliery, near Mahanoy City, under Pierce Management, Scranton, has been conducting research into the clarification of breaker water by which fine coal is carried into creeks. A silt-settling tank, placed at this mine, has been giving excellent results. A plant has been erected by the Stevens Coal Co. at the old North Franklin colliery, at Trevorton, long ago abandoned. Here an old coal bank is being reclaimed. It proves to have little nut and stove coal, possibly because time has caused some disintegration, but the coal, being from the Lykens bed, is extremely clean, especially after treatment by Hydrotators. It is reclaimed by a LeTourneau 16-cu.yd. Carryall (*Coal Age*, June, 1939, p. 48). Just as the Glen Alden Coal Co. has been coloring its coal blue, the Philadelphia & Reading Coal & Iron Co. is now marking its coal with red specks for identification.

Nothing better shows the possibilities of recovery of coal left in the ground as the result of the primitive technique of earlier days than the success of the Sullivan Trail Coal Co., West Pittston, and the Exeter Coal Co., Exeter, in removing coal that other companies years ago had left. Where anticlines interrupted the continuity of the coal bed, the Sullivan Trail company in places had to use belts discharging down long chutes into other belts to transport the coal.

At times it mined an upper bed from a lower one with the aid of conveyors and, finding areas of coal in the lower bed unapproachable directly from that bed by reason of fallen and abandoned workings, it reached those areas through the upper bed, carried the coal up on belts to that higher level, transported it on belts in the upper bed and then lowered it by a rock chute to the lower bed, from which it was hoisted. In the Clark bed, Vulcan shaking chutes and LaDel shakers were used for filling cars on roads traversing the seams, but in the other beds the coal was assembled from a large area as described and dropped into cars at a single loading point. Chain-flight conveyors also were used (*Coal Age*, October, 1939, p. 37).

New Anthracite Preparation Facilities in 1939*

Coal Company	Plant Location	Capacity Net Tons of Feed per Hour	Preparation Equipment
Childston Coal Co.	Childston, Pa.	12	Menzies [1]
Consagra Coal Co.	Blakely, Pa.	94	Menzies [1]
Dial Rock Coal Co.	Exeter, Pa.	20	Wilmot [2]
Green Ridge Coal Co.	Scranton, Pa.	25	Wilmot [2]
Hammond Coal Co.	Girardville, Pa.	250	Chance [3]
		220	Wilmot [4]
Hudson Coal Co.	Parson, Pa.	25	Wilmot [5]
Monitor Co., Inc.	Eckley, Pa.	200	Chance [6]
Morea-New Boston Breaker Corporation	Morea, Pa.	280	Menzies [1]

* Also includes rebuilt plants and major installations of preparation equipment in existing structures.

[1] Menzies cone-separator equipment. [2] Wilmot hydroseparator equipment. [3] Chance sand-flotation equipment, with Wilmot. [4] Including Wilmot Hydrotators and hydroseparators. [5] Wilmot Hydrotator equipment. [6] Capacity of Chance cone for buckwheat and larger; two du Pont classifiers installed for rice and smaller.

SUBSTANTIAL PROGRESS

By No Means Restricted in 1939

To Mechanical Loading and Transport at Face

IN A MINE, as in an army, operations are successful only if the "service of supply" is efficient. Length of the working day counts for little unless the coal is moved away as fast as loaded. Unless there are substantial track, speedy locomotives, ventilation affording light and air, drainage that makes good track and favorable working conditions, the loading machines and the conveyors cannot have the steady output that pays their interest, maintenance and amortization and lowers operating cost per ton loaded.

Leading among the needful accessories for successful mechanization is good track. A product of the mine blacksmith shop and not of the factory, the road always was the weakest link in the operating chain and it ditched the cars when they were most needed at the face. With heavy Thermit-welded track, the Hanna Coal Co. early in 1939 placed in service an eight-wheel locomotive mounted on four "Axless" trucks. It is rated to travel at 30 miles per hour and is streamlining today at 21 miles (see p. 76). Because of the increasing distance from workings to tipple, speedier travel was mandatory, and this locomotive, with another that it is hoped will be purchased in 1940, should adequately provide the needed service.

Thermit-welded track with treated ties has been adopted for all underground main track by the Sycamore Coal Co. at Cinderella, W. Va., and by the Sycamore Coal Corporation at Patterson, Va. At the New Orient mine of the Chicago, Wilmington & Franklin Coal Co., thanks to separate main lines for empties and loads, 80-lb. rail for loads and 70-lb. for empties with welded joints; with treated 6x7-in.x 6-ft. ties; with steel, treated-wood and gunite roof supports, dispatcher-control and switch-position signals, warning lights that indicate blocked track—the full gamut of good underground railroading—a production of 10,000 tons is delivered at the shaft daily in a 7-hour shift, despite long hauls (*Coal Age*, January, 1940, p. 25). To speed up main haulage in the mine in which it has its eight-wheel locomotive, the Hanna Coal Co. has provided an automatic signal system increasing both safety and efficiency.

Many companies in 1939 added to their mine-car equipment or replaced their antiquated units. Among those reporting were the Hanna Coal Co., which at the mine having shuttle cars has introduced 145 rotary-dump mine cars to replace the 2-ton cars formerly used, which the company found could not be operated with economy. At the Frederick Mine, Valdez, Colo., the Colorado Fuel & Iron Co. added 75 three-ton steel cars, and at Diamond Smokeless Mine of the Imperial Coal Corporation, Boltz, Pa., $10,000 was expended in rebuilding and increasing the capacity of the mine cars.

For delivery in February of this year, the Clover Splint Coal Co., Closplint, Ky., has ordered 60 steel cars, part for replacement and part for extension of haulage. Other operations adding this kind of equipment last year were the Barney Mine, of the Alabama By-Products Corporation, Cordova, Ala., 25 steel cars; Borderland Mine No. 1 of the Borderland Collieries Co., Borderland, Ky., a number of end-dump all-steel cars of 4-ton capacity to be loaded by mechanical units.

At Happy Collieries, Warren, in eastern Kentucky, Sanford-Day drop-bottom cars are about to be installed so as to enable the management to operate with one man its headhouse, including weighing and dumping. The weighing will be done automatically and the mine is expected to produce 1,000 tons daily. At Barney mine, the Alabama By-Products Corporation eliminated all major humps in the principal haulage entries, resulting in a maximum inside gradient of 1.5 per cent.

Explosives received renewed consideration in 1939. Mechanization is being severely hampered by the demand that coal be shot only off-shift. To escape such regulation, flameless explosives are being sought. In the past year, the Hercules Powder Co. has introduced an explosive sheathed in bicarbonate of soda, which sheathing emits carbon dioxide that will extinguish any flame which attempts to pass through it (*Coal Age*, August, 1939, p. 68). Such explosives, originating in Belgium, have been used extensively in Europe. It is asserted that the sheathing acts also as a cushion to reduce the shattering effect on the coal.

Cardox and Airdox were in increasing use and other developments in the art of pushing down coal without violence have been reported. Among the new users of Cardox is the Colorado Fuel & Iron Co., which installed an additional plant at Rockvale No. 3 mine, Canon City, Colo. In Utah, natural carbon dioxide from gas wells, 98.8 per cent pure, is used for Cardox shooting. This method of breaking down coal has made strides recently in Pennsylvania and West Virginia.

At the mines of the Jones Collieries, Inc., with headquarters at Rachel, W. Va., the use of mechanical loading makes it impossible in the mine to separate impurities from the coal. Care-

ful shooting, therefore, is necessary to the end that the bands will not be broken so small that their removal will be difficult. The bottom bench is lifted by Cardox, and the top bench is brought down by powder. According to the management, if carbon dioxide were used in the top bench, the gas would find its way into minute fractures and make a tender roof out of one normally sound.

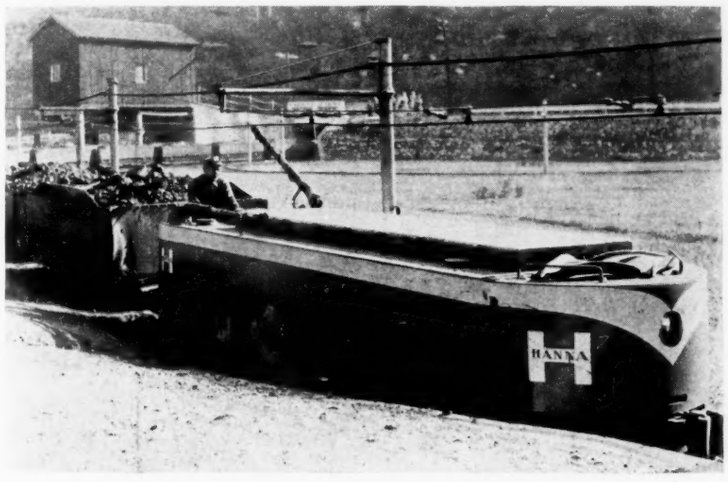
At Pageton, W. Va., the Page Coal & Coke Co. constructed a gravity drainage ditch which at some points is 35 ft. deep. It passes through a hard pyrite rock. Not only will it greatly improve drainage conditions but it will tend toward the loading of drier, cleaner coal during wet weather. By lifting the water over a high point by a short lift, gravity drainage is provided at the mine of the Upland Coal & Coke Co., Elkhorn, W. Va., and thus pumping charges are reduced.

The consciousness of the coal industry to ventilation is keen as ever, and realization that a new fan will not make amends for a mine not properly equipped for economical ventilation is being driven home. Colta mine, of the Alabama By-Products Corporation, sunk a new airshaft and manway before installing a new fan entailing an expenditure of $12,000. This greatly improved both ventilation and safety. All permanent airways were supported with treated timber to protect them against roof falls. This has replaced untreated material that, in this mine, has a life of only about two years.

The Page, Crozer, and Upland Coal & Coke companies installed modern fans during 1939, the first a four-speed motor-driven 8-ft. Jeffrey Aerodyne unit which replaced a large Clifford-Capell steam fan installed in 1904. At the Baker mine of the Glendora Coal Co., Terre Haute, Ind., a drillhole 210 ft. deep and 23 in. in diameter was sunk to the mine and cased with ⅜-in. steel pipe welded in sections as lowered, the work being completed Oct. 10. This was used to supplement the ventilation at the face (*Coal Age*, January, 1940, p. 76).

At one of the mines of Hanna Coal Co., it is necessary to clean up an old heading to reach a block of unmined coal. As the roof has fallen to a great height, removing the caved material would be difficult, hazardous and expensive. In consequence, the approach will be made with a circular steel lining tube.

Rope-and-button conveyors have been installed at the Red Jacket's Keen Mountain mine in Virginia and at Happy Collieries, Warren, in eastern Kentucky. The former is remarkable in that it has two drives, one at the top and the other at the bottom near the foot of the hill, this being made necessary because of the easy slope of the conveyor, 23 deg. 53 min., and the high friction coefficient of the coal (*Coal Age*, January, 1940, p. 45). Carbon Fuel Co., at its new operation, No. 7, at Carbon, W. Va., is lowering coal down an incline with a maximum of 24 deg. of pitch by a 30-in. troughed-belt conveyor from a 300-ton storage tank which receives coal from an 800-ft. conveyor line in the mine. (*Coal Age*, April, 1939, p. 51). Monitor-lowering equipment of Link-Belt type has been provided by the Block Coal Co. at Block, Tenn.



Hanna Coal Co.'s streamliner that streaks along at over 20 miles per hour over the ideal tracks of the Willow Grove Mine, Neffs, Belmont County, Ohio.

Aerial tramways have been installed by the Hanna Coal Co. for mine and tipple refuse and by the Jones Collieries, Inc., which latter takes the refuse from the tipple to a high cone-shaped dump. This waste pile well illustrates the segregation arising from the coning of coal and refuse, for the material which rolls to the bottom and outside of the pile is so clean that it is reclaimed for domestic purposes. However, as may be imagined, the refuse as a whole is superior to that usually found.

New Mines Constructed

Early in 1939 the mine of the Koppers Coal Co. at Kopperston, W. Va., began to get into its stride (*Coal Age*, April, 1939, p. 71); and about the middle of August the National Fuel Co., Denver, Colo., hoisted its first coal from the Eagle mine (see p. 56). Happy Collieries completed its plant at Warren, to which reference has been made, erecting a modern four-track tipple, rope-and-button conveyor and 150-ton storage bin.

Another development was the consolidation of the main haulage systems of Nos. 1 and 5 mines of the Pursglove Coal Mining Co., at Pursglove, W. Va., into a single larger operation which will be called Mine No. 15. This permitted coal from No. 1 mine to be brought to a new tipple and cleaning plant at No. 5 which was erected in 1938. As the gages and voltages of the two mines were different, this was an expensive operation, but with resultant economy and with an improvement in the quality of the output from No. 1 due to the facilities provided by the preparation plant.

Other improvements were a 150-man miners' washhouse during the past summer, built by the Roslyn-Cascade Coal Co., Ronald, Wash., but this was destroyed by fire Dec. 26; a remodeling and modernization of the store at the Bradford mine of the Alabama By-Products Corporation with installation of a self-service system; several additions to the machinery in the shops of the Independent Coal & Coke Co., Kenilworth, Utah; a rock-dusting machine at the Robinson No. 4 mine of the Colorado Fuel & Iron Co., Farr, Colo., and a fireproof engineering office for the Leckie Collieries Co., Aflex, Ky. The Union Pacific Coal Co., Rock Springs, Wyo., published a revision of its safety code, and the Shawmut Mining Co., St. Marys, Pa., issued a book of the same nature for the guidance of its employees.

BITUMINOUS MECHANIZATION

Marked by Striking Gains In Installation of Loaders and Conveyors

With mobile-loader installations up 21.2 per cent and conveyor sales at a new high (p. 63), bituminous mechanization progress was country-wide in 1939. Mobile-loader applications were widened to include slope driving. In coal, loaders were served by an increasing number of conveyors and rubber-tired haulage units. Shakers with self-loading heads made substantial gains in the conveyor field.

THE STEADY progress in mechanization of the bituminous industry continued without pause in 1939—a year marked by a rapid increase in the number of rubber-tired haulage units behind loading machines. Sales of mobile loaders, which approximate fairly closely the number installed, totalled 292 units last year, an increase of 21.2 per cent over the 1938 total of 241, according to data compiled by the Bituminous Coal Division of the Department of the Interior and the U. S. Bureau of Mines (see p. 63 of this issue).

Sales of conveyors, excluding conveyors in haulageways and slopes, aggregated 1,095 in 1939, including a number for use behind loading machines. Conveyor sales in 1938 totalled 749, making the increase in 1939 46.2 per cent. Pit-car loader purchases dropped from 139 in 1938 to 2 in 1939. On the other hand, 18 scrapers were bought by the industry in 1939, compared with six in 1938. Data compiled by *Coal Age* also indicate that 65 rubber-tired haulage units were shipped to the mines in 1939 (see p. 60) which, with 34 units in the period 1936-38, brought the total in the hands of operators up to 99 at the end of the year.

Conveyors continued to hold the spotlight in the mechanization of thin coal, but also made some headway in thick seams—particularly shaker-type units with self-loading heads. On the other hand, a number of loading machines went into seams that a few years ago would have been considered the province of the conveyor.

Slopes sunk by loading machines showed a substantial increase. At the new Paradise mine of the Crescent Coal Co., Crescoal, Ky., as an example, a 7x16-ft. slope 438 ft. long was driven an average of 19 ft. per day of three shifts, using a Joy 8BU loading machine. Total slope-sinking time was 93 days, including timbering. Counting drilling and mucking alone, however, the maximum advance per day was 35 ft., compared with the 19-ft. average. And at a new slope being driven by the Ingle interests in Indiana at the end of the year, average advance per day, under difficult conditions, was about 15 ft. In general, with slopes about 7x15 ft., the average rate of sinking runs from 15 to 30 ft. per day, with the maximum in a few cases 40 ft. A combination of belt and chain conveyors brought the spoil to the surface in some instances, with hoists and cars in others.

Operators using mobile loading machines continued to adopt larger cars, although where rubber-tired haulage units were installed, permitting loading cars in trips, the increase in capacity was put in the buggies, making it unnecessary in several cases to change car size. The year 1939 also was characterized by at least one addition to the ranks of operators using large drop-bottom cars behind loading machines, these cars pulling to hoppers from which the coal is placed in the regular small-car equipment by elevating conveyors.

Companies employing conveyors as the transportation medium behind loading machines also increased in 1939, these conveyors as a rule dumping into mother belts on the entry. Normally, with this type of transportation, the loading machine worked in from two to four places, each equipped with a conveyor. Finally, as noted above and detailed in the article on p. 60, the rubber-tired haulage unit, providing both high capacity and the advantages of multiple-unit changing, was installed in substantial numbers in 1939.

There were few departures from standard face-preparation practices in 1939, although the trend to track-mounted cutting-and-shearing machines and deeper cuts with all types of equipment continued. At the same time, there was a substantial increase in special small-horsepower shortwall cutting machines for use with conveyors. Several large cutters of the normally track-mounted type were equipped with caterpillar trucks for use with rubber-tired haulage; rubber-tired cutters are promised in the future. A number of operators employing rubber-tired haulage, however, stuck to shortwall machines, moving them on caterpillar-mounted trucks. And with the rise in buggies, interest in other types of rubber-tired equipment, such as drills, compressors, etc., increased. Low-pressure coal-breaking mediums, such as Cardox and Airdox, also found increasing favor in mechanical mines in 1939.

Roof support at the face was characterized in 1939, particularly in the Appalachian region, by a major in-

crease in the use of screw-type roof and timber jacks. At Mine No. 22 of the Island Creek Coal Co., for example, standard Simplex mine jacks fitted with special attachments (see p. 102 of this issue) were used to hold the two safety crossbars carried at the face in 16-ft.-wide headings. The special jacks were dictated by the fact that cage size limited bar length to 13½ ft. Thus, with the usual legs, the loading machine had difficulty getting coal along the rib, whereas the special screw jacks can be set at an angle to permit a complete clean-up.

Jacks Support Roof

Numerous other operating companies installed screw jacks for safety bars, and many used screw-type roof jacks either as safety props or to hold up roof or drawslate over the cut until the coal could be loaded, as at Crescent No. 2 mine of the Republic Steel Corporation, in western Pennsylvania, where Simplex jacks are used to keep 11 in. of drawslate in place until loading is completed, after which the drawslate is taken down and gobbed or loaded out. Several operating companies in Alabama and elsewhere installed the new Markham adjustable safety mine prop, comprising a hollow-steel base member in which a 4 x 4- or 6 x 6-in. timber is inserted. To set the prop, the timber is pulled up against the top and locked in place by a dog, which can be released from a distance to collapse the prop. A special cap piece can be used on top of the prop to permit tightening by driving a steel wedge, and a jacking attachment also is available for use where the prop is used to hold down shaker drives, pumps, compressors, pipe lines, and the like.

Mechanization work in 1939 was spread over the entire country, with the major activity, however, in the Appalachian region. But other regions where mechanical loading had been the practice for years expanded facilities. In Washington, as an example, the Northwestern Improvement Co. added three shaker conveyors at its already completely mechanized property—the only one in the State—while the Strain Coal Co. began experiments with conveyors and installed two for entry-driving at Black Diamond.

Utah and Colorado also were active in installing conveyors, loading machines and auxiliary equipment in 1939. At the Castle Gate (Utah) property of the Utah Fuel Co., for instance, plans for a larger output required development of seams not hitherto mined from the No. 2 workings and therefore necessitated considerable rock work and the installation of shaking conveyors for mining low coal as well as developing raises and loading out rock brushing. Four such conveying units, with duckbill loading heads, were acquired, along with a new air-cooled 280-c.f.m. portable compressor; new drilling equipment for tunnel driving and top brushing; 12 new side-dump cars for rock disposal; and 50 additional mine cars. Cutting equipment was supplemented by two new track-mounted universal machines. Mine power lines were supplemented and enlarged.

Utah Fuel began planning in 1938 for mechanization at its Clear Creek property, where, up to that time, the entire production had been cut by shortwalls, loaded by hand and hauled with horses. Roof conditions dictated a trial of top cutting, and consequently a track-mounted universal machine was installed and operated in the winter of 1938-39. The advantages were so marked that the entire output now is mined by top cutting and shearing. Last summer, the tipple was revamped for rotary dumping and new 146-cu.ft. mine cars 40 in. high and equipped with spring bumpers were installed, followed by a new track-mounted loading machine in the fall, which is "doing a very satisfactory job." These changes necessitated mechanical haulage by cable-reel gathering locomotives. As all this equipment naturally required more power, a 2/0 cable, carrying 4,000 volts, was taken 8,000 ft. inside the mine to the m.g. substation and the main inside hoist was changed from d.c. to a.c.

Improvements at Sunnyside consisted of completely eliminating hand-loading for shaker conveyors with duckbills. Lower, more suitable mine cars were installed, and a new section was opened up, necessitating grading and tunneling, along with a large amount of track work and timbering.

Completion of mechanization at the Kenilworth (Utah) mine, Independent Coal & Coke Co., was another 1939 development involving the addition to two Goodman shaker conveyors with automatic duckbills, a Jeffrey L-400 track-mounted loading machine and a Sullivan 7AU track-mounted cutting and shearing machine to the six mobile loaders, two shaker conveyors and other equipment already in service. Mining two seams 15 ft. thick, Independent uses the two shakers with duckbills in driving raises when needed and at other times in mining pillars and recovering top coal. Solid work is done by the L-400, a Goodman track-mounted loading machine and Joy 11BUs. In this solid work, some 6 ft. of top coal is left for recovery with Joy 5BU machines loading onto the two shaking conveyors without duckbills during the pillar-recovery cycle.

In Colorado, in addition to other projects, the Utah Fuel Co. installed four shaker conveyors with automatic duckbills and two caterpillar-mounted loading machines at its Somerset mine, thus raising mechanical output

Numerous conveyor installations, many with self-loading heads, characterize mechanization developments in 1939.

to over 50 per cent. Accompanying equipment included a cable-reel and two storage-battery locomotives. Additional track, bonding and more adequate power-distribution were collateral activities, along with installation of a new 150-kw. m.g. set and two battery-charging stations.

Calumet No. 2 mine, Calumet Fuel Co., Delcarbon, Colo., was completely mechanized with shaker conveyors and duckbills, found particularly adaptable to Delcarbon conditions, which include 40 in. of coal and a fragile top. Conveyors have eliminated tracklaying in rooms and top brushing, and have reduced the timbering expense, inasmuch as places can be worked out before retimbering is required. Along with mechanical loading came mechanical haulage (two storage-battery locomotives and the necessary charging and generating equipment, in turn requiring extensive additions to power lines).

New Mine Conveyorized

National Fuel Co. completed opening of the new Eagle mine in Weld County, Colorado, in 1939. Sinking the 370-ft. hoisting and air shafts started March 22 and was completed the last of May. On June 1, dismantling and moving the steel tipple at the old Puritan mine was started. Reerection at the new operation was completed about the middle of August. Meantime, an Ottumwa 7- to 10-ft. stepped-drum electric hoist was installed, the hoisting distance being 524 ft.

The coal at Eagle ranges from 8 to 10 ft. Full retreat from the boundaries is the goal. Headings are driven 10 ft. wide and the plan is to drive rooms 23 and 24 ft. wide on 40-ft. centers and mine pillars on the retreat. All mining is done with Goodman shaker conveyors using the latest-type duckbills. From the end of May, when development was begun with a temporary tipple at the air shaft, until Dec. 9, the record was 9,560 ft. of main entries, 3,330 ft. of cross entries, 5,512 ft. of main airways, 2,072 ft. of cross airways and 39 rooms necked, with production rising to 900 tons per day.

Southwestern conveyor installations continued to increase in 1939 and the all-conveyor operation of the Sunshine Anthracite Coal Co. (*Coal Age*, March, 1939, p. 35) reached its goal of 1,000 tons per day. In Oklahoma, the San Bois Coal Co., McCurtain, installed several Jeffrey room conveyors. The Henryetta field started more conveyor units. In this district, the practice is to work walls 80 to 90 ft. long. Equipment ranges from shaker conveyors, as at Atlas (*Coal Age*, May, 1939, p. 41), where two units get 350 tons per day of two shifts; shaker conveyors for driving headings coupled with chain face, room and mother conveyors, as at the Blackstone mine, Ben Hur Coal Co.; to chain conveyors alone, as at the Starr mine, Starr Coal Co., operating on the four-panel plan. In other words, four panel, or wall, conveyors, with the necessary face conveyors, are worked as a unit, the coal from three coming by a cross conveyor to the fourth panel unit, which carries it to a trip-loading elevating conveyor. An article on the Starr conveyor work will appear in an early issue of *Coal Age*.

Iowa developments were marked by several additional experimental installations of conveying equipment, particularly in the longwall fields. At the same time, considerable interest was manifested in the possibilities of loading machines. Experiments with the scow system of mining were carried on by the Rathbun Coal Co., in the Centerville district, with the expectation of adopting this method of mining in 1940.

Illinois and Indiana, for a number of years the leaders in mechanically loaded coal, added to mobile-loader equipment in 1939 but in general stuck to the standard room-and-pillar system of mining with mine-car and locomotive changing. However, in addition to more rubber-tired haulage units (p. 60), several conveyor-transportation systems went into service in thinner coal, particularly in Saline County. With these systems, as a rule, a loading-machine territory was made up of two to four rooms, each with a chain conveyor discharging onto a mother belt on the entry. And in Indiana, one operation started the use of big drop-bottom cars behind loading machines, these cars discharging to hoppers, from which the coal is transferred to the regular mine cars. Illinois and Indiana also furnished most of the examples of driving slopes with loading machines.

Western Kentucky mechanization chalked up further gains in 1939, with both mobile loading machines and conveyors—usually of the shaker type with automatic loading heads—finding considerable favor in driving entries, working rooms or both. One new rubber-tired haulage installation went into the field.

Ohio also made some rubber-tired haulage installations, in addition to adding to mobile-loading equipment. New completely mechanized mines in western Pennsylvania included Mather Collieries, of Pickands, Mather & Co., which now uses ten Joy 8BU loaders, with two more as spares. Two additional Jeffrey government-approved locomotives were purchased to bring the total up to fourteen for use behind loading machines. Additions to equipment at Crescent No. 2 mine, Republic Steel Corporation, included a Jeffrey L-400 track-mounted loader, and developments at this operation were characterized by adoption of a full-retreat plan of mining with all openings on 60-deg. angles to increase efficiency.

Central Pennsylvania, while manifesting interest in mobile loaders, continued to favor conveyors in 1939. New installations included four Jeffrey conveyors, with drills, blowers and other auxiliaries totaling $20,000 by the Diamond Smokeless Coal Co., which also rebuilt its mine cars to increase capacity at a cost of $10,000. Complete mechanization of this operation is contemplated in 1940. Mechanization experiments also were carried on by the Cambria Smokeless Coal Co. and the Imperial-Cardiff Coal Co.

More Loaders Installed

Mechanization in northern West Virginia (see December, 1939, *Coal Age*) also was marked by increases in number of loading units, such as the installation of additional Goodman 260B loading machines at Dawson No. 2 mine, Dawson Coal Co., to make it 100-per-cent mechanical. Several rubber-tired haulage installations started operation.

Southern West Virginia purchased both mobile loaders and conveyors. Koppers Coal Co., for example, increased hand-loading conveyors in service 45 units (30 chain, 14 shaker and one spool-type belt conveyor, the latter an experiment to determine the possibilities of deep-room work). The Koppers conveyor installations were almost entirely in thin coal and were designed to further concentrate operations and reduce deadwork. Mechanical loading was not practicable in any instance either because of physical conditions or impurities in the coal. Koppers also added four mobile loaders to its total, chiefly in the northern part of the State.

One of the many operations in the country replacing and shifting equipment was the Gay Coal & Coke Co., in southern West Virginia, which re-

placed a 5BU machine in No. 1 mine with a 7BU and an 8BU in No. 3 with a 14BU, moving the 8BU to No. 2. No. 3 also was equipped with a low-vein shuttle-car unit (p. 60). At the Monitor-Eagle mine of the Monitor Coal & Coke Co., in the same county, mechanical loading of the Eagle seam (averaging 40 in. in thickness) hit its stride in 1939 with two new 8BU machines in service and one old 8BU as a spare.

Monitor-Eagle falls in the group of operations using cutting machines to eliminate bothersome material over the seam. For this purpose, a Goodman 824-BA low-vein slabbing machine was purchased and cuts in the 9 to 15 in. of rash over the coal. Average rash thickness is 12 in. and over it in some places is 4 to 24 in. of drawslate. All this material must be taken down, along with additional top in haulageways for height. Part is gobbed and the remainder is loaded out. In August, 1939, in two sets of entries, each consisting of five headings 20 ft. wide and one 18 ft. wide, machine shifts totaled 91; coal output was 19,779 tons (217 tons per machine-shift); and impurities handled (by hand) were 9,400 tons (estimated). Face-preparation at Monitor-Eagle includes, in addition to gobbing or loading out rash and drawslate, sweeping out the cut, brushing the face and cleaning up and sweeping the floor. Average daily production per man employed (including office and supervisory forces) was nearly 9 tons in August, 1939.

Conveyors Increase Output

Among the new completely conveyorized mines in southern West Virginia are the MacAlpin and Penman mines, at which mechanization has been followed by a substantial increase in production without addition to housing facilities and the like. Production cost as yet is unchanged but is expected to come down somewhat as more experience is gained. Goodman and Jeffrey low-vein shortwalls are used with the conveyors. At Anjean, W. Va., the Leckie Smokeless Coal Co., hitherto using two Jeffrey chain conveyors in low and steep places in the Sewell seam, started work with similar equipment in the Fire Creek coal (30 to 48 in. and very hilly).

Additional installations of the "Smith pit-car loader," employing a box-shaped hand-loaded skip with self-dumping bottom pulled to and from the face by wire ropes, featured southern West Virginia developments in 1939. Supplementary equipment of this type was installed by the Gauley Mountain and Mason coal companies, while the Logan-Chilton Coal Co., Rita, W. Va., bought a unit with a capacity of 1,100 lb. for use primarily in development work, handling slate, etc. Two such loaders were put in service in the Cranberry No. 1 mine of the New River Co. in August. Average coal thickness is 38 in. Maximum box load in 1,500 lb. and with a nine-man crew production was averaging better than 75 tons per shift. The loaders were installed in a section where they could be tested under unfavorable conditions, and have been used both in advancing rooms and recovering pillars. An article on this work will appear in an early issue of *Coal Age*.

Hand-loaded "skips" of this type find increased favor in southern West Virginia and eastern Kentucky.

Three Smith loaders also were installed at the Aflex (Ky.) mine of the Leckie Collieries Co., which previously had used Jeffrey room and face conveyors to drive places 96 ft. wide in addition to regular hand loading. Originally, the Smith loaders were used on 96-ft. faces with crews of seven men (boom man, three loaders, two cutters and a foreman). This was changed to a 24-ft. face with a boom man, two loaders, a cutter and one foreman for two units. Results have been substantially better.

Mobile loaders and rubber-tired haulage equipment also played their parts in Kentucky developments in 1939. As an example, the Borderland Collieries Co. is handling practically its entire output of Winifrede block coal with Joy 8BU loaders and 4-ton all-steel end-dump cars. The loaders, it is reported, apparently are increasing the percentage of large lump, and also are proving valuable in loading and gobbing the heavy middle slate, sometimes running up to 42 in. in thickness. Cutting is done with Goodman slabbers, which also drag out the middle slate. These are supplemented by two bottom-cutting machines for outlying sections, robbing and emergencies.

Loaders and conveyors also progressed in Virginia. As a case in point, the Panther Coal Co., Roseann, supplemented hand-loading with two 8BU machines now handling approximately one-third of the output. One is used chiefly in development and the other in room-and-pillar mining. The Virginia Iron, Coal & Coke Co., as another example, equipped its Monarch mine, near St. Charles, with a conveyor unit comprising four Jeffrey room conveyors with face conveyors, one gathering conveyor with elevating conveyor, four "Aerodyne Midget" blowers, four Jeffrey electric coal drills and one "Brownie" car-spotting hoist. These units started operating in September "and so far have proved very successful." Two Goodman shaker conveyors with automatic duckbills and auxiliary equipment were ordered in 1940 for driving entries and by the end of the year it is expected that the mine will be completely mechanized, including a belt-type gathering conveyor.

Tennessee also figured in the mechanization columns last year, principally in the installation of conveyors. The new Jellico Coal Co., for example, in opening a new section in 38- to 42-in. coal separated from a rider seam

by 40 to 48 in. of rock, purchased two Goodman shaker conveyors with duckbills for entry driving and also handling the top rock. Headings are 13 ft. wide and are separated by 21-ft. pillars. Provision is made for loading trips by turning the track through a crosscut, down the back heading and back through another crosscut to make a "circle." Crews comprise seven men on the day shift and eight at night. After each cut of coal, the rock is shot and loaded out with the duckbill. Production was running 140 to 200 tons of rock and coal per shift.

Mechanization activity in Alabama continued the fast pace of late years, with equipment including both mobile loaders and conveyers. The Stith Coal Co. put in additional Joy units to increase mechanized tonnage to nearly 50 per cent. One result has been a considerable increase in daily output. A Joy loader also was purchased by the Cane Creek Mining Co.

With four new conveyors, the mechanization program at the Colta mine of the Alabama By-Products Corporation was completed, and when hand places already started are worked out the operation will be 100-per-cent mechanical except for a small amount of development work. Conveyors operate in units of four, each unit with one loading point, and the mining plan provides for each unit doing its own development, other than panel and slope headings. Rooms are driven approximately 35 ft. wide with face conveyors. Four additional conveyors were added at Praco and work was continued on a semi-longwall system (four faces at the start of 1940).

Alabama (Dolomite No. 3, Woodward Iron Co.) also furnished an outstanding example of extending entries with conveyors in a 4½-ft. bottom bench of coal carrying a 9- to 10-in. rock band about 14 in. up from the floor. This band is gobbed. An entry consists of six headings 18 ft. wide on 52-ft. centers. Two Sullivan 10B "Buddy" and four Jeffrey 35–20S shortwalls are used to cut the coal. Conveying equipment comprises a LaDel chain-type mother conveyor with Jeffrey elevating conveyor, one Jeffrey room-type chain unit used as a cross conveyor, one LaDel cross conveyor, one Jeffrey room conveyor and five 350-ft. LaDel shaker conveyors. Average heading advance was 10 ft. per shift (*Coal Age*, July, 1939, p. 35).

Reopening Blocton No. 9 in 1938, the Black Diamond Coal Co. was producing 600 tons a day in 1939 from coal averaging 36 in. Equipment consisted of six Goodman and two LaDel shaker conveyors working in rooms 50 ft. wide. Conveyors are turned across the face by 90-deg. angle sections. On the other hand, places 200 ft. wide in 32-in. coal were being driven at the Lindbergh mine, Brookside-Pratt Mining Co., using Jeffrey face and room conveyors, the latter discharging directly into mine cars.

RUBBER-TIRED HAULAGE

Marked by 200-Per-Cent Jump

In Installations in Both High and Low Coal

A MAJOR increase in rubber-tired haulage units behind loading machines was an outstanding development in bituminous mechanization in 1939. From three such units 3½ years ago the total in the hands of operators had grown to 34 at the end of 1938. In 1939, according to data collected by *Coal Age*, total shipments to mines aggregated 65, bringing the number in the hands of mining companies up to 99. Installations by companies from the earliest date to Jan. 1, 1940, are listed in the accompanying table.

Rubber-tired haulage was originated by James H. Fletcher, Chicago consulting engineer. First equipment, made up of Baker-Raulang tractors powered by Exide-Ironclad batteries pulling Sanford-Day 3-ton drop-bottom trailers, was installed at the Blue Bird Coal Co's. mine, Carrier Mills, Ill., July, 1936, to serve Joy loaders. At Blue Bird, the trailers dump into Barber-Greene hoppers set in pits in the bottom, from which the coal is taken outside by belt conveyors. In most of the subsequent installations, however, the coal is removed from the hoppers by feeders and elevating conveyors, the latter discharging into mine cars.

Fletcher equipment was followed by the Joy shuttle car, first installed by the Hanna Coal Co. of Ohio, followed by the Katherine Coal Mining Co., Lumberport, W. Va., in 1938. The Joy shuttle car essentially is a four-wheeled unit (steering on two wheels) with a conveyor in the bottom for discharging the contents into—in most cases—an elevating conveyor for transfer to mine cars. So far, most of the cars have been powered by Exide-Ironclad, Gould or Philco batteries, although a few cable-reel units are in service.

The elevating conveyor is fitted with flanged wheels so that it may be towed around either on rails or the mine bottom. Jacks permit adjusting the height of discharge. The conveyor boot may be sunk into a shallow pit or set on the bottom with a timber ramp as an approach. A pothole is shot out in the trip-loading opening to provide maximum clearance under the elevator discharge for topping of cars. In at least one

case, however, the elevating conveyor, as will be detailed below, has been dispensed with.

A second type of shuttle car, designed by A. L. Lee, consulting engineer for the Union Collieries Co., and installed in the company's Renton (Pa.) mine in 1939, is provided with a cable reel and individual driving motors for each wheel. Both the front and back wheels may be used in steering. The elevating conveyor is equipped with rubber-tired wheels.

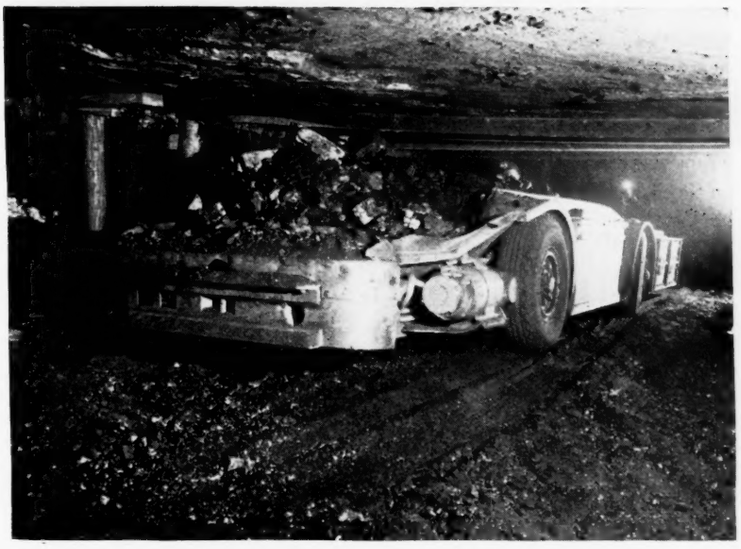
Rubber-tired haulage has been installed in coal running as low as 38 in. in thickness, it is reported, although this seems the exception, the usual minimum average height to date being more in the neighborhood of 4 to 4½ ft., with quite a few operations falling in the 5-ft. class. Some special mining systems have been worked out, while a few existing plans have been modified to a greater or lesser degree. One special plan developed by Mr. Fletcher and used by Blue Bird and the Hart Coal Corporation (*Coal Age*, January, 1938, p. 47) is based on starting a series of narrow places and then gripping them out to both sides to form a face up to 500 ft. or more in length. This face then is slabbed, say, five times, after which the process of necking and gripping is repeated to establish another long face.

With the adoption of rubber-tired haulage at Federal No. 1 mine, Koppers Coal Co., Grant Town, W. Va., recovering 6½ to 7 ft. of Pittsburgh coal, a mining plan based on a combination of solid- and pillar-work units was developed. At the end of 1939, two 6½-ton Joy shuttle cars were in use with an 11BU loader, with a third handling supplies or helping out on long hauls. Two additional cars were installed in January to serve a second loader. The two loaders and five cars constitute a full developing and robbing unit. The working plan is based on driving all openings on an angle, and also on getting a balance between solid and pillar work so that one loading machine always can be going ahead opening up places while a second follows behind to take out pillars.

Getting a proper balance between solid and pillar coal to an individual loading station was responsible for a modification of the standard "block" system at the Laura Lee mine, Hutchinson Coal Co., Lumberport, W. Va. First, the mine went to the "room-and-pillar" system—i.e., rooms on shorter centers to narrow the pillars. Roof conditions, however, forbid openings over 12 ft. wide. Therefore, shuttle cars usually were forced to back up one or two times to turn the 90-deg. corners. Consequently, the mining plan was revised for rooms on a 60-deg. angle. As a result, average loading-machine output is up 60 per cent, batteries hold up better, and moving other equipment is facilitated.

At other shuttle-car operations in northern West Virginia (December, 1939, *Coal Age*), where conditions permit driving openings 14 ft. wide, cars experience no difficulty in getting around in 90-deg. block projections. Therefore, no substantial change has been made in mining practices, although the Pinnikinnick No. 25 mine of the Consolidation Coal Co., Clarksburg, adopted a special track layout with a remotely controlled "Brownie" car puller for moving trips past the elevating conveyor.

In sections, such as the Middle West, where pillars customarily are left, most companies adopted the "key-room" system. In other words, the center place in a group of rooms—usually seven—driven abreast serves as a haulway leading directly to the loading station. From this center place, angle crosscuts lead off into the side rooms to cut distance and facilitate shuttle-car travel. As an example, this is the practice at the new Paradise mine, Crescent Coal Co., Crescoal, Ky., to be featured in an early issue of *Coal Age*. Paradise to date also has dispensed with ele-



A low-vein shuttle car heading out with 3½ tons of coal.

Shipments of Rubber-Tired Haulage Units to Mines, July, 1936, to Jan. 1, 1940

	Number of Units	Approximate Unit Capacity, Tons
Fletcher Tractor-Trailers		
Blue Bird Coal Co., Carrier Mills, Ill.	9	3
Moffat Coal Co., Sparta, Ill.	6	5
Ingle Coal Co., Oakland City, Ind.	5	5
Hart Coal Corporation, Mortons Gap, Ky.	10	3
Joy Shuttle Cars		
Rocky Mountain Fuel Co., Colorado	4	6½
Consolidated Coal Co., Nason, Ill.	10	6½
Peabody Coal Co., Mines 43, 47, 53, Illinois	10	6½
Black Mountain Corporation, Mines 30 and 31, Kenvir, Ky.	4	3
Consolidation Coal Co., Jenkins, Ky.	3	3
Crescent Coal Co., Crescoal, Ky.	7	3½
Hanna Coal Co., Ohio	3	5
Sunday Creek Coal Co., Ohio	1*	3½
Heisley Coal Co., Nanty Glo, Pa.	2	3
Monroe Coal Mining Co., Revloc, Pa.	2	3
Union Collieries Co., Renton, Pa.	1*	6
Consolidation Coal Co., Clarksburg, W. Va.	3	6
Gay Coal & Coke Co., Mt. Gay, W. Va.	2	3
Hutchinson Coal Co., Lumberport, W. Va.	2	5
Jones Collieries, Inc., Rachel, W. Va.	2	6
Koppers Coal Co., Grant Town, W. Va.	3	6
Katherine Coal Mining Co., Lumberport, W. Va.	9	5
Lee Shuttle Cars		
Union Collieries Co., Renton, Pa.	1*	6½

* Cable-reel units; all other units listed, as far as known, are powered by batteries.

vating conveyors with its 3½-ton Joy shuttle cars. Instead, the track is sunk at a loading station to bring the tops of the mine cars below the bottom. This adds but little to expense, as bottom must be taken anyhow on haulageways. Wood ramps are built on each side of the track and the shuttle units run out on these to dump directly into the mine cars.

Rubber-tired installations in 1939 also included a number engaged in entry-driving. Jones Collieries, Inc., Rachel, W. Va., for instance, bought two 6-ton Joy cars, plus elevating conveyor and trip-pulling hoist, for use behind a 7BU loader in driving seven 12-ft.-wide headings on 40-ft. centers. In Ohio, Sunday Creek Coal Co. installed one of the few cable-reel cars now in service (a low-vein unit) to accompany a 14BU loader. Goodman shortwall cutter with caterpillar-mounted truck and a Jeffrey A-6 coal drill in driving three headings making up a main entry. Average height is 6 ft., although it frequently runs less. The roof is a poor sandstone, under which is 2 to 6 in. of black slate which comes down with the coal.

With the rise in rubber-tired units, increased attention was focused on auxiliaries to fit in with this type of trackless mining. Where shortwall cutting equipment has been retained, the universal practice is to use special self-propelling caterpillar trucks. But where conditions dictate top cutting and shearing, as at several northern West Virginia operations, standard track-mounted machines also have been mounted on caterpillars. Reports indicate, however, that new machines for top cutting, cutting and shearing or cutting out partings in trackless sections are in the offing. The need for such equipment, particularly where partings must be removed, is stressed by several mining men. Other trackless-mining equipment includes drilling machines mounted on rubber tires, such as the Sullivan equipment at Katherine, and rubber-tired compressors, including a new Sullivan unit at Paradise.

Sufficient experience was gained in 1939 to throw some light on other problems connected with rubber-tired haulage. Heavy grades—up to 15 per cent, for example—are not an unduly severe handicap. The same cannot be said of a soft bottom, particularly when water is present. In these connections, the experience of the Ingle Coal Co., Oakland City, Ind., using 5-ton Fletcher tractor-trailer units, perhaps is typical. Normal grades at this operation, it is reported, are not a major problem, as the units seem to handle 5 tons almost as well as a gathering locomotive. But a wet bottom saps battery power and slows the speed materially. As a result, where the haul is long, bad roadways have been paved with 2 x 12-in. planks 10 ft. long spiked at each end to 4 x 8-in. stringers 8 ft. long. Although seemingly expensive at first thought, this practice has greatly increased battery life and has trebled the speed of the units over bad spots. Bad top prevails at this operation also, with the result that timbers are set to clear the sides of the trailers only 18 in. However, as the operators are quite accurate where the roadway is good, little difficulty has been encountered on this score.

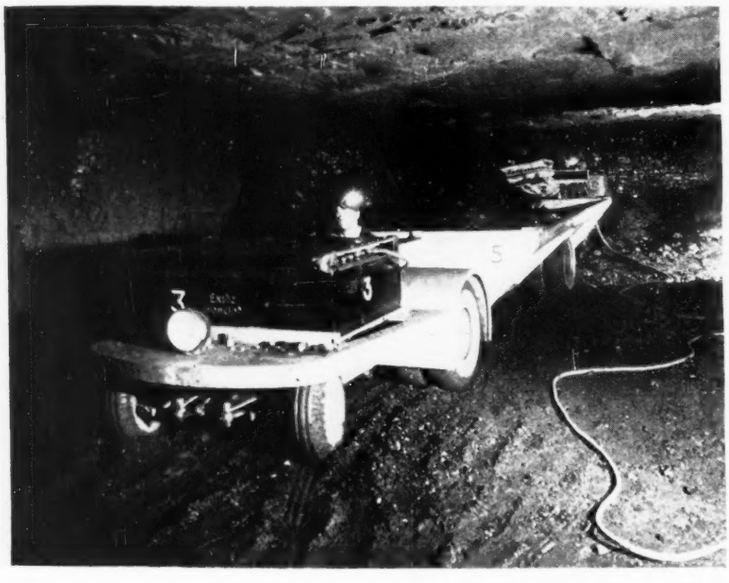
Under the usual rubber-tired mining plan, the major equipment required behind a loading machine, exclusive of special drilling units, caterpillar trucks or caterpillar mountings for cutting equipment, etc., consists of two or three haulage units, although there are exceptions: an elevating conveyor or pit hopper, feeder and car-loading conveyor and a battery-charging station (except where cable-reel cars are employed). Track and tracklaying labor in the working places are eliminated. Usually, the number of men in a crew remains unchanged or decreases; seldom is there an increase.

Tonnage Rises Recorded

Production in a few instances is little different from that obtained with mine cars and locomotives. These are the exception, however, as the adoption of rubber-tired equipment normally is followed by an increase in loading-machine output. The magnitude of the increase depends upon conditions and previous operating practices in the mine or district, but in many cases is substantial. In one region, where coal height runs 6 to 7 ft., loading machines served by rubber-tired equipment were averaging 450 to 500 tons per shift, compared with around 250 tons at the majority of the mines in the same district using cars and locomotives.

At operations where units have been in long enough for some experience to be gained, average reported output runs as low as 175 tons per shift where the coal averages 48 in. in thickness and contains a parting which must be removed before shooting or loading. Usually, however, the output in coal of comparable thickness is materially higher. In 4½- to 5½-ft. coal, production per loading machine shift usually is 250 to 350 tons, with some mines going substantially higher. In coal 6 ft. and over, 400 to over 600 tons seems to be the usual range, with the average around 450 to 500 at most properties. As more experience is gained, these figures undoubtedly will improve. With rubber-tired equipment, the practice, depending upon the type of unit, is to limit the average haul from a group of places to the loading station or pit to 400 to 700 ft. and the maximum to 1,000 to 1,500 ft. Longer hauls are distinctly in the minority.

A 5-ton tractor-trailer unit serving a loading machine.



MECHANIZATION SALES

Increase More Than Output With Rises in Both Loaders and Conveyors

By THOMAS FRASER, F. G. TRYON, J. J. GALLAGHER, and M. VAN SICLEN *

SALES of equipment for mechanical loading of coal showed a decided upturn in 1939 following the lows registered in last year's reports. Orders for new mobile loaders recovered to the 1937 level, while sales of conveyors and duckbills established all-time high records. Sales of scraper loaders also exceeded those of 1938 by a substantial figure, although not approaching the volume of business done in this type of equipment when it was in high favor in the early thirties. Pit-car loaders, alone among the various types of loading equipment, showed a decrease in 1939.

The increased rate of introduction of mechanical-loading equipment in 1939 was in keeping with the general increase in activity of the coal industry during the year. It is noteworthy, however, that mechanization progress outran the general improvement in coal business indicated by the trend of production. In terms of total capacity, 1939 sales of loading equipment topped 1938 by 21.4 per cent, whereas 1939 total production of bituminous coal and anthracite exceeded 1938 production by 12.8 per cent.

Total Units Sold by Type—Total sales of mobile loading machines reported in 1939 amounted to 292 units, exactly duplicating the 1937 total. This figure is substantially under the record for the peak year 1936, when 311 units were sold, but is much in excess of the preceding years up to 1936, during which time loader sales were increasing consistently year by year. Aggregate sales of conveyors of all types established a high record of 1,311 units in 1939. This figure includes both hand-loaded conveyors and those equipped with duckbills and other self-loading heads. It involves some overlap in reporting sales of the duckbills themselves and sales of the shaker conveyors on which they are used, the extent of which cannot be precisely determined. Making a rough allowance for possible duplication in reporting, the net increase in the number of conveyor units sold in 1939 is 21.6 per cent over the year before—almost exactly the same as the increase in mobile loaders.

The largest increase in conveyor sales occurred in the shaker types equipped with duckbills or other loading heads, shipments of duckbills more than doubling from 1938 to 1939. Sales of equipment of these types were widely distributed, but the increase was especially marked in the Appalachian region with many new users in West Virginia, Pennsylvania and Kentucky. At the same time, sales of hand-loaded conveyors established a new, though less spectacular, record. The accompanying tabulations include a small number of conveyors sold for use in conjunction with mobile loaders; conveyors intended for transportation in haulageways or slopes are not included.

Sales of pit-car loaders dropped to the lowest figure of record, with two units reported for the entire bituminous field. Manufacturers of scraper loading machines reported sales of 26 units in 1939, compared with only 10 in 1938.

New mobile-loading-equipment purchases in 1939 account for the larger proportion of the total increase in mechanical-loading capacity added

Table I—Mechanized Loading Equipment Sold to Bituminous and Anthracite Mines as Reported by Manufacturers, 1933 to 1939, Inclusive [a]

	1933	1934	1935	1936	1937	1938	1939	Per cent Increase (+) or Decrease (−) 1939 over 1938
Mobile loaders	41	55	115	344	292	241	292	+ 21.2
Scrapers [b]	65	34	22	28	29	10	26	+160.0
Conveyors [c]	396	610	681	994	1,095	990	1,311	+ 21.6 [d]
Pit-car loaders	18	26	28	11	32	139	2	− 98.6

[a] The figures for 1933 to 1936 included reports from 28 manufacturers. In 1937 one manufacturer indicated that he was no longer producing this type of equipment and accordingly was dropped from the active list; however, at the same time another manufacturer was added to the list, and the number of reporting firms remained at 28. In 1938 one manufacturer of material-handling machinery began the production of underground loading ecuipment and in 1939 two new manufacturers entered the field, increasing the total number reporting to 31.

[b] Reported as scrapers or scraper haulers and hoists.

[c] Includes hand-loaded conveyors and those equipped with duckbills and other self-loading heads. As sales of both loading heads and shaker conveyors are counted, the figures involve a certain measure of overlap, which cannot be determined accurately. It should also be noted that a small number of conveyors sold in recent years, particularly in 1936 to 1938, were for use in conjunction with mobile loading machines.

[d] The figure of +21.6 per cent represents the approximate net increase in the number of conveyor units sold, after allowing for overlap in counting self-loading heads and shaker conveyors as explained in Note c.

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during the year. This conforms to the experience of the past several years. Conveyors, however, represent a larger part of this increased capacity than in former years.

Total Sales by States—Purchases of mechanical loading equipment were made for installation in nineteen coal-producing States in 1939, with Michigan added to the previous list.

Table II has been prepared to show the total number of units placed in each State or region. In a few States, separate figures could not be shown without disclosing the business of individual manufacturers. On each item, letter symbols indicating the kinds of machines are arranged in proper sequence to show roughly the order of importance of the several types of equipment in the year's business in terms of capacity. For example, West Virginia operators purchased a total of 471 units of mechanical loading equipment in 1939, and in this aggregate of new equipment, mobile loaders furnished the largest addition to capacity, followed by conveyors, scraper loaders and pit-car loaders in the order named.

Types of Machines Sold Compared With Previous Years—Varying trends in the adoption of new equipment for loading coal are shown in Table III, which compares recent installations with the number of machines previously in service. Number of mobile loaders in active use by producers of bituminous coal increased from 488 in 1929 to 980 in 1936, the year when the last complete enumeration was made. The number of new machines installed in the last three years approaches the total in use as of 1936. The total number of mobile loaders available for service now amounts to approximately 1,805, assuming those installed in previous years to be in operating condition.

Conveyor Activity Marked

Because of a somewhat uncertain conception as to what properly may be defined as a conveyor unit for statistical purposes, the record of deliveries of conveyors probably is not as accurate as that of mobile loaders. However, the methods of counting and tabulating used in this series of reports have been maintained consistently from year to year, and the general upward trend of conveyor installations is definitely established. Sales of conveyors have shown a more uniform rate of increase than any other type of loading equipment. Increased activity in this division of mechanization was marked in 1939, both as to aggregate volume of new business during the year and as to broad distribution of the equipment.

Sales of scraper loaders have held in a rather narrow range since 1933, new units placed in operation being around 20 to 30 a year in each year except 1938, when the total dropped to 10. Sales for 1939 totaled 26, of which 8 went into the Pennsylvania anthracite field and 18 were distributed among the Alabama, Tennessee, and West Virginia bituminous fields.

In the Pennsylvania anthracite region, the use of scraper loaders reached a peak in 1934 and likewise has declined steadily since that period, but a few units of new scraper loading equipment continue to go into that territory each year.

Regional Distribution of Mechanized Capacity—The record for 1939 shows a continued growth of mechanization in the Appalachian region, where activity has been increasing at a rapid rate in the past few years. Pennsylvania operators, for example, purchased 23 mobile loading units in 1937; 47 in 1938; and 89 in 1939, adding in the single year 1939 almost as many units as were in operation in 1936. A very large proportion of these, although not all, went into the western part of the State to operators in the Pittsburgh and Freeport seams. Pennsylvania took a larger part of the year's production of mobile loaders than any other State. It was closely followed by West Virginia, where a total of 85 new units were installed last year, compared with 80 in 1938 and 73 in 1937. This makes a total of 238 installations during the past three years, or almost twice as many as the entire number of machines in use in the State previously.

The Appalachian region also extended its lead in the installation of new conveyor units. These went in large part into the central Pennsylvania region and into widely distributed sections of West Virginia, Virginia, Kentucky and Tennessee. West Virginia operators alone installed 375 new conveyor units in 1939, followed by Pennsylvania bituminous operators with 225 units, and Pennsylvania anthracite operators with 216 units. These two States together took 816 units in 1939, constituting approximately 62 per cent of the total sales of conveyors last year. Alabama, Kentucky and Ohio operators also purchased new conveyor equipment in increasing volume in 1939.

Table II—Total Number of Units of Mechanized Loading Equipment Shipped for Use in Each State or Region in 1938 and 1939

(L = Mobile loading machines; P = Pit-car loaders; S = Scrapers; C = Conveyors and duckbills)

	Number of Units of All Types Shipped in 1939	Types of Equipment in Approximate Order of Capacity in 1939
Northern Appalachian States:		
Pennsylvania	315	L.C.S.
Ohio and Michigan	62	L.C.
Southern Appalachian States:		
West Virginia	471	L.C.S.P.
Virginia	60	C.L.
Kentucky	158	L.C.
Alabama	97	C.S.L.
Tennessee	42	C.L.
Middle Western States:		
Illinois	56	L.C.
Indiana	14	L.C
Trans-Mississippi States:		
Arkansas and Oklahoma	18	C.L.
Iowa	2	L.
Colorado	50	L.C.
Utah and Montana	19	C.L.
Wyoming	40	L.C.
North Dakota and Washington	3	C.
Total bituminous	1,407	L.C.S.P.
Pennsylvania anthracite	224	C.S.
Grand total	1,631	L.C.S.P.

Shift Still Going On

Bituminous operators of the Middle West and Trans-Mississippi regions, where the trend to mechanization manifested itself on a large scale in the late twenties, continued the purchase of new equipment at about the same rate as in the preceding three years. The shift from hand to mechanical operation is still going on in those regions, though at a somewhat more moderate rate than in the years of initial growth.

Accurate statistics of the total tonnages of coal loaded mechanically in 1939 are not yet available. However, such data as are at hand corroborate the general trend indicated by the sales of equipment. In West Virginia, for example, 20,554,675 tons of coal was loaded by machines and conveyors in the first nine months of 1939, amounting to 27.9 per cent of the total production in the State in the same period. The corresponding figure for the first nine months of 1938 was 12,908,202 tons, or 19.8 per cent of the total production.

Number of Mining Companies Using Mechanical-Loading Equipment—Mechanization of coal-loading operations continued to spread to new fields and new companies in 1939, as indicated by many new purchasers of equipment during the year. Table V shows the number of separate purchasers of mobile loaders by States and regions, divided into two categories: (1) former users and (2) new users who purchased for the first time during the current year. According to operators' reports, there

were 149 bituminous coal companies using mobile loaders in 1936. Sales records of equipment makers show that at least 103 new users were added in 1937-1938 and 36 in 1939. This indicates a grand total of 288 or more companies that are now using or have used mobile loading equipment.

West Virginia had the largest number of new purchasers of mobile loaders in 1939, with ten companies added to the list. There were seven new purchasers in Pennsylvania, four in Virginia and three in Kentucky. The record also shows a substantial volume of repeat orders placed by companies already using such equipment, indicating continued progress toward complete mechanization.

Conveyors likewise went to many new users in 1939, but the reports of sales in this category were not all completely itemized so as to permit separation between repeat orders and new customers.

Trackless Gathering Equipment—The self-powered trackless haulage unit for gathering coal from loading machines is an innovation in coal-mine mechanization which met with substantial interest during the past year.[1] These units usually consist of a battery-powered shuttle car (a few cable-reel units are in service) or a battery-powered tractor-and-trailer unit and are equipped with pneumatic tires. They are employed to transport the coal from the mobile loader to a central transfer station located on the haulageway. Transfer of the load from trailer or shuttle car into mine cars may be effected either by means of a hopper or an elevating conveyor.

Rubber Tires in 1936

Gathering units of this type were installed in bituminous coal mines as early as 1936. The number of installations is now sufficient to make it advisable to record this development in the official statistics. Two manufacturers reported the sale of such equipment in 1939 and these manufacturers had distributed a total of 96 units to bituminous coal mines in seven States at the end of the year. In order of numbers installed, the States were Illinois, Kentucky, West Virginia, Indiana, Pennsylvania, Colorado and Ohio.

[1] See "Mining Methods and Mechanization in Northern West Virginia," *Coal Age*, December, 1939, page 51. Also, J. H. Fletcher, "Mechanical Mining Using Trackless Gathering," American Institute of Mining and Metallurgical Engineers, Technical Publication 1094 (New York meeting, February 1939).

Table III—Sales of Mechanized Loading Equipment, 1927 to 1939, Compared With Total Number of Machines in Active Use in Preceding Years

	Number of Machines in Active Use, as Reported by Mine Operators							Number of Machines Sold as Reported by Manufacturers		
	1930	1931	1932	1933	1934	1935	1936	1937	1938	1939
Bituminous mines:										
Mobile loading machines	545	583	548	523	534	657	980	292	241	292
Scrapers	150	146	128	93	119	78	106	13	6	18
Pit-car loaders	2,876	3,428	3,112	2,453	2,288	2,098	1,851	32	139	2
Conveyors equipped with duckbills and other self-loading heads	140	165	159	152	157	179	234	835[b]	749[b]	1,095[b]
Hand-loaded conveyors — number of units	[a]	[a]	[a]	525	574	670	936			
Anthracite mines (Pennsylvania):										
Mobile loading machines	384	5	11	18	14	1	.....	.....	.....	.....
Scrapers		457	479	455	517	507	504	16	4	8
Pit-car loaders		28	24	19	25	22		.....	.....	.....
Conveyors equipped with duckbills and other self-loading heads	421	1	17	12	13	30	1,790	260[b]	241[b]	216[b]
Hand-loaded conveyors — number of units		547	818	940	1,338	1,563				

[a] Number of units not reported in these years. [b] Reported as face conveyors (hand-loaded), "shaker drives" and "duckbills." The numbers sold in 1937, 1938 and 1939 are not exactly comparable with the number in use in 1936 because of uncertainties in defining what constitutes a conveyor and because of certain overlaps in the reporting of duckbill loading heads and shaker conveyors.

Table IV—Comparison of Mobile Loaders, Scrapers, and Conveyors in Actual Use in 1936, With Sales Reported in 1938 and 1939 by Regions

	Mobile Loaders			Scrapers			Conveyors[a]		
	In use in 1936	Sales in 1938	Sales in 1939	In use in 1936	Sales in 1938	Sales in 1939	In use in 1936	Sales in 1938	Sales in 1939
Bituminous									
Northern Appalachian States:									
Pennsylvania	92	47	89	31	..	1	366	52	225
Maryland	..	..	..	..	..	..			...
Ohio	47	15	17	..	..	..	18	23	45
Michigan	..	..	..	..	..	..	..	..	
Southern Appalachian States:									
Alabama	10		7	27	2	8	64	64	82
Kentucky		39[b]	28		..	..	35	98	131
Tennessee	5			11	..	..	21	20	41
West Virginia	126	80	85		3	9	196	332	375
Virginia	9	9	8	..	..	..	70	5	52
Middle Western States:									
Illinois	431	38[c]	28	..	..	..	7	20	28
Indiana	146		12		..	..			2
Trans-Mississippi States	114[d]	13[e]	18[f]	37[g]	1[h]	..	393[i]	135[i]	114[k]
Total bituminous	980	241	292	106	6	18	1,170	749	1,095
Anthracite									
Pennsylvania	..	..	..	504	4	8	1,790[l]	241	216
Grand total	980	241	292	610	10	26	2,960	990	1,311

[a] Includes hand-loaded conveyors and conveyors equipped with duckbills or other self-loading heads. The numbers in use in 1936 are not exactly comparable with the number sold in 1938 and 1939 because of uncertainties in defining what constitutes a conveyor and because of overlap between sales of duckbill loading heads and shaker conveyors. The comparison, however, will serve to indicate which regions have the largest proportionate increases. [b] Mostly in Kentucky. [c] Mostly in Illinois. [d] Includes Colorado, Montana, New Mexico, North Dakota, Utah and Wyoming. [e] Includes Colorado, Montana, Oklahoma, Utah and Wyoming. [f] Includes Colorado, Iowa, Montana, Oklahoma, Utah and Wyoming. [g] Includes Arkansas, New Mexico, Oklahoma and Wyoming. [h] Missouri. [i] Includes Arkansas, Colorado, Iowa, Montana, Utah, Washington and Wyoming. [j] Includes Arkansas, Colorado, Iowa, Oklahoma, Utah and Wyoming. [k] Includes Arkansas, Colorado, Montana, North Dakota, Oklahoma, Utah, Washington and Wyoming. [l] Includes a few pit-car loaders.

Table V—Number of Bituminous Coal-Mining Companies That Purchased Mobile Loaders in 1937–1938–1939

(Based upon records covering 86 per cent of the total sales)

		Purchasers in 1937–1938		Purchasers in 1939	
	Users in 1936	Former Users	New Users	Former Users	New Users
Northern Appalachian States:					
Pennsylvania	10	4	23	13	7
Maryland	2	..	..	..	..
Ohio	8	3	7	3	3
Southern Appalachian States:					
West Virginia	35	16	25	21	10
Virginia	5	2	5	1	4
Kentucky	2	2	24	10	3
Tennessee	2	1	1	..	1
Alabama	3	1	3	3	1
Middle Western States:					
Illinois	36	16	6	8	1
Indiana	23	5	4	5	1
Trans-Mississippi States:					
Arkansas	..	..	1	..	..
Colorado	2	1	1	..	2
Iowa	1	..	..	..	1
Montana	5	1	1	1	..
North Dakota	2	..	..	..	..
Oklahoma	..	..	2	1	..
Utah	7	4	..	1	1
Washington	3	..	..	..	..
Wyoming	3	2	..	1	1
Total	149	58	103	68	36

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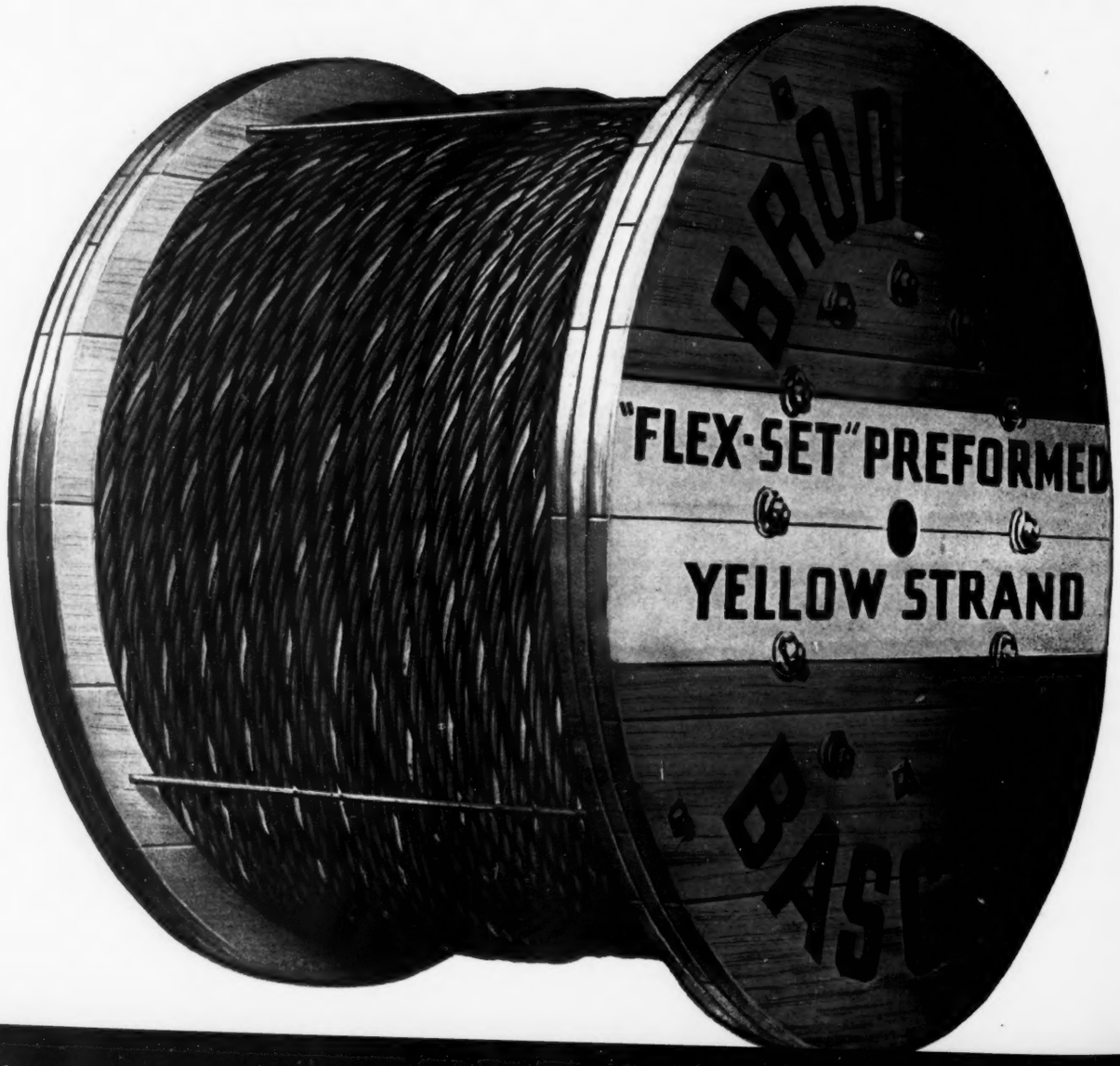
YELLOW



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BITUMINOUS STRIPPERS

Add to Working Facilities

In a Year Marked by Increasing Production

WITH PRODUCTION up, bituminous stripping continued to roll along in 1939. Although installations of large stripping and loading units were few in number, preparations were made for several new pits in 1940. Meanwhile, equipment at existing pits was improved or supplemented. Development of small operations using draglines, small shovels or large scrapers for overburden removal continued at the high level set in previous years, particularly in Ohio, Pennsylvania and elsewhere outside the Middle West and Southwest, where big strippers center.

New operations started in 1939 include the Tecumseh Coal Co., near Boonville, Ind., where stripping will be done with a Marion "knee-action" shovel with a 35-cu.yd. high-tensile all-welded dipper. The knee-action design takes the crowd mechanism off the boom and places it over the shovel deck. The dipper handle, therefore, has a "knee" in it. This design was first applied to a 4¼-cu.yd. loading shovel installed by the Commercial Fuel Co., Kansas, in 1938, where one of its demonstrated advantages has been a longer clean-up radius. This better clean-up characteristic is expected also to be beneficial in stripping.

At large-scale going pits, new stripping units were added to increase or maintain output either directly in stripping or in helping out equipment already on the job. Cases in the latter group included draglines for benching off the overburden ahead of the stripping shovel, as well as large tractor-powered scrapers for benching, opening box cuts and the like. And properties adding to equipment for direct use in uncovering coal included, as an example, the Osage mine, Ottawa, Ill., where a new 5-W diesel-powered Monighan dragline was installed to increase output from the "LaSalle Third Seam."

Aside from the "knee-action" loading shovel mentioned above, developments in loading in 1939 adhered closely to conventional methods except at the Broken Arrow No. 4 mine, Seneca Coal & Coke Co., Catoosa, Okla., where a second Joy 11BU loading machine was installed late in the year to load an 18-in. seam. With two in service, original shovel equipment was eliminated and the two Joy units now get the entire output of 1,600 to 2,000 tons per day (one loading shift).

Drilling developments were featured by another increase in the use of side-wall units. At the new Millstadt (Ill.) stripping of the Midwest Radiant Corporation, uncovering 4½ to 7 ft. of No. 6 coal under 20 to 50 ft. of overburden with a 385-B electric shovel assisted by a 2-W Monighan dragline benching off 12 ft. of the top, horizontal holes frequently are drilled in the coal. Over the seam is 0 to 3 ft. of black slate followed by 0 to 14 ft. of limestone. Total thickness of hard material seldom exceeds 12 to 14 ft., however. Where the black slate is absent, drilling is done in the coal because of the limited thickness of limestone and the fact that it cracks up easily, making it necessary to have as much solid material over the charge as possible to prevent it from blowing up and out. Under Millstadt conditions, shooting on the seam has had little effect on the coal. Loading is done by 50-B 3-yd. electric and GA-3 gas-air shovels, usually operating in

Stripping with tractor-powered scrapers in Ohio.

tandem. The coal is hauled in 28-ton United Iron Works drop-bottom trailers pulled by Dart gasoline tractors.

In the field of vertical drilling, several southern Illinois companies, including the Pyramid Coal Corporation, adopted the oil-field type of rotary drills and report three to four times the footage.

Transportation again was marked by additions to tractor-trailer haulage units, either in new operations or to replace steam in old pits, as at a Maumee Collieries Co. mine near Jasonville, Ind., which adopted Dart tractors and 25-ton Austin-Western trail cars.

Although the so-called "small" strippers continued to favor draglines and small shovels, usually powered by internal-combustion engines, a number relied on rooters, bulldozers and large scrapers to move overburden.

Among the new companies which began to hit their stride in 1939 was the Clarion Coal Co., recovering the Lower Kittanning seam in Clarion County, Pennsylvania. One of many new operations in this and other districts in Pennsylvania, Ohio and elsewhere, Clarion employs a Lima 1001 dragline and a Marion 382 shovel, both diesel-powered, in stripping. With 20 ft. of overburden, this equipment can open pits 60 ft. wide. Coal is loaded with a Lorain 77 diesel shovel. A railroad tipple with a capacity of 15,000 tons a month prepares the product.

Ohio furnished many examples of the use of scrapers in removing overburden. Blue Bell Coal Mines, Ltd., a 500-ton operation near Dover (April, 1939, *Coal Age*), where the typical cover consists of 6 ft. of clay and top soil and 20 ft. of fairly hard gray shale with bands of "iron ore" at 4-ft. intervals, uses a LeTourneau "Rooter" to break up 2-ft. layers of shale. This broken material is moved out by LeTourneau and Continental scrapers powered by Caterpillar tractors. A "Rooter" also is used by the Hillside Coal Co., Zanesville (October, 1939, *Coal Age*, p. 41), to break up 10 ft. of shale. Occasionally, a hard rock up to 2 ft. in thickness over the coal must be shot. Overburden is removed by LeTourneau "Carryall" scrapers. These same practices are followed by many other companies in Ohio and elsewhere.

Stripping companies greatly expanded programs for improving worked-over land, including planting trees and grass, either with or without leveling off spoil piles, and constructing roads and lakes to adapt the areas to recreational purposes or game preserves. In numerous cases, operators have set out to improve each year an acreage equivalent to that stripped.

BITUMINOUS PREPARATION

Marked by Sustained Progress In New Plant and Equipment Installation

WITH mechanical cleaning registering another substantial gain, a marked increase in new construction, rebuilding and addition to facilities characterized bituminous preparation in 1939. New plants, either with or without mechanical cleaning, were designed with capacities up to 1,000 tons per hour. Reconstruction or additions, in many cases, represented sizable expenditures, and ranged from a single vibrating screen, crusher or mechanical cleaner up to complete rebuilding.

Meeting the higher standards set by consumers naturally continued as the major factor in preparation improvements. This was particularly evident in the case of stoker coal, with which producers are increasingly preoccupied, and activity in the production of this fuel was marked by widespread installation of special cleaning equipment, crushers and tramp-iron magnets, screening facilities for both sizing and dedusting, and blending equipment making possible "prescription" shipments.

General efficiency and a low labor cost in plant operation were not neglected, however, as evidenced by the continued trend toward raising the size of coal sent to washers to reduce hand-picking labor and assure greater uniformity. Gains in mechanical loading were another incentive for preparation revisions.

Combinations of wet and dry cleaning equipment were not so numerous in 1939, although a number of operators again practiced bypassing fines around washing units or went to air equipment to avoid the problems of wet coal, water clarification and slurry recovery. And with wet-cleaning, there was a growing trend to concrete settling tanks instead of the steel cones common in other years. Drying developments were marked by a substantial increase in the number of heat-type units, as well as in centrifugal units for straight drying or the recovery, drying and improvement of quality of fine coal.

Heat-drying units employing screens made decided gains in 1939, in which year a new unit was offered in which the hot gases are pulled up instead of down through the coal. Also, there was growing acceptance of the contention that shaking and squeezing on the screens, aside from evaporation, are a major factor in moisture elimination.

Also, heat-drying on screens was marked by conclusion by one company that the dryer, in addition to mechanical moisture removal, should be operated not as a primary evaporating medium but as a means of raising the temperature of the coal so that the water would be driven off in supplementary cooling stages. And in one screen-drying installation last year, heat was eliminated, the company relying on shaking plus the scrubbing action of high-velocity cold air to produce coal that would not freeze except under extreme conditions.

Auxiliary activities to make the product more acceptable included a substantial increase in dustless treatment with oils, waxes, wax-and-oil blends and other products, such as "Coalkote," "Coaladd," "Dustlix," "No-Kol-Dust," "Waxol," "Duo-Sol" extract and water, oil-molasses-water mixtures, calcium chloride and other hygroscopic salts, etc. With petroleum or petroleum-base products, the tendency was to go to still higher viscosities in treating low-rank coals. Trademarking, either by coloring the coal or using printed labels, increased in 1939, with a number of companies installing Dustlix trademarking machines automatically feeding gummed labels into the smaller sizes or feeding out larger gummed labels to be detached and put on by hand in the case of lump.

New Cleaners Widespread

Installations of mechanical cleaners in 1939 ranged from Washington to Alabama. In the former State, a number of plunger-type jigs were installed, including a Forrester unit by Morris Bros. and a jig at Newcastle and rewash tables at Black Diamond by the Strain Coal Co.

Utah got another full-scale washing, drying and blending plant in 1939. In this Utah Fuel Co. plant, built by Link-Belt, Castle Gate, Clear Creek and Blue Blaze coals will be prepared separately. Equipment includes an air-pulsated-jig washing unit, "Roto-Louvre" heat and Elmore continuous centrifugal (minus $\frac{3}{16}$-in.) dryers for stoker coal, and a stoker-coal blending plant made up of three 125-ton storage bins with proportioning feeders and mixing equipment for shipping blends of any desired consistency.

The Montana Coal & Iron Co., Washoe, Mont., installed one of several of the so-called "unit washeries" last year, a Jeffrey job with a capacity of 50 tons of 4 x $\frac{1}{2}$-in. coal per hour. Similar units (75 tons per hour) were purchased by the Moffat Coal Co., Oak Hills, Colo., and the Robinson Coal Co., Pleasanton, Kan. Kansas also offered an example of addition to meet the increased demand for mechanically cleaned coal, the Pioneer Coal Co. installing a third McNally-Norton automatic washer to bring washing capacity up to 300 tons per hour and the top size up to 6 to 7 in.

Kansas, furthermore, is the home of some of the several cleaning plants which "temper" screenings by washing up the ash to make them suitable for certain applications. At the new No. 22 mine of the Clemens Coal Co. (January, 1940, *Coal Age*, p. 41), all coal up to 7 in. in size is washed. In this, No. 22 joins the growing list of plants cleaning up to 6-, 7- or 8-in. All coal, including lump, may be broken to 7 in. at this property and, along with crushed lump pickings, first goes to one Jeffrey Baum-type jig. Minus $1\frac{1}{4}$-in. screenings separated out of the washed coal from this box, along with crushed middlings, goes to a second box, where the ash content of the screenings is built up from around $7\frac{1}{2}$ to $9\frac{1}{2}$ to $10\frac{1}{2}$ per cent, the jig being adjusted to use only minus $\frac{3}{16}$-in. material for this purpose.

Missouri developments included the installation of Plat-O coal-washing tables by the Crowe-Fulton-Spangler

New Bituminous Preparation Facilities in 1939*

Coal Company	Plant Location	Capacity, Net Tons of Feed per Hour	Preparation Equipment
American Rolling Mill Co.	Nellis, W. Va.	55	Koppers-Rheolaveur [1]
Bair Collins Co.	Roundup, Mont.	20	Link-Belt
Berwind-White Coal Mining Co.	St. Michael, Pa.	115	Roberts & Schaefer [2]
Big Bend Coal Mining Co.	Twin Rocks, Pa.	65	Roberts & Schaefer [2]
Blue Bird Coal Co.	Carrier Mills, Ill.	100	Morrow [3]
		100	Link-Belt
Blue Diamond Coal Co.	Bonny Blue, Va.	300	Morrow [4]
Brookside Pratt Mining Co.	Winfeld, Ala.	15	Deister Machine [5]
Calumet Fuel Co.	Delcarbon, Colo.	50	Link-Belt
Cannelton Coal & Coke Co.	Cannelton, W. Va.	50	Kanawha
Chafin-Jones-Heatherman Coal Co.	Peach Creek, W. Va.	250	Kanawha
Chicago, Wilmington & Franklin Coal Co.	West Frankfort, Ill.	200	Jeffrey [6]
Christopher Mining Co.	Osage, W. Va.	300	Fairmont [7]
Colcord Coal Co.	Stickney, W. Va.	200	Robins
Colorado Fuel & Iron Corporation	Salida, Colo.	250	Link-Belt
Consolidation Coal Co.	Clarksburg, W. Va.	400	Fairmont [7]
Costanzo Mining Co.	Wheeling, W. Va.	75	Jeffrey [8]
Crescent Coal Co.	Bevier, Ky.	250	Link-Belt
	Crescoal, Ky.	250	Morrow [9]
	Crescoal, Ky. (2)	80	Fuel Process [10]
Crystal Block Coal & Coke Co.	Roth, W. Va.	100	Kanawha
			Fuel Process [10]
Crowe-Fulton-Spangler Coal Co.	Harvey, Mo. (2)	45	Deister Machine [11]
Culgun Coal Co.	Richmond, Ohio.	75	Morrow
Dawson Coal Co.	Clarksburg, W. Va.	250	Fairmont [7]
Ebensburg Coal Co.	Colver, Pa.	525	Jeffrey
Elk Lick Coal Co.	Jerryville, W. Va.	200	Fairmont [7]
Fairmont & Baltimore Coal & Coke Co.	Shinnston, W. Va.	250	Fairmont
Fourseam Coal Corporation	Diablock, Ky.	200	Kanawha
Franklin County Coal Corporation Inc.	Royalton, Ill.	110	Koppers-Rheolaveur [12]
		100	Koppers-Rheolaveur [13]
George E. Miller Coal Co.	Joller, Pa.	50	Heyl & Patterson
Glogora Coal Co.	Blue Pennant, W. Va.	300	Fairmont [14]
Hanna Coal Co.	Dun Glen, Ohio.	370	Link-Belt
Happy Collieries	Warren, Ky.	150	.....
H. E. Harman Coal Co.	Harman, W. Va.	225	Roberts & Schaefer [15]
Heisley Coal Co.	Nanty Glo, Pa.	45	Roberts & Schaefer [16]
		20	Wilmot [17]
Hickory Grove Coal Mining Corporation	Jasonville, Ind.	40	Cent. & Mech. Ind.[18]
Independent Coal & Coke Co.	Kenilworth, Utah	120	McNally-Pittsburg [19]
Island Creek Coal Co.	Holden, W. Va.	200	Kanawha [36]
	Holden, W. Va.	200	Kanawha [36]
Kelleys Creek Colliery Co.	Ward, W. Va.	200	Kanawha
Kent Coal Mining Co.	Coal Run, Pa.	200	Heyl & Patterson
Knox Consolidated Coal Corporation	Bicknell, Ind.	160	Link-Belt [20]
Koppers Coal Co.	Helen, W. Va.	300	Fairmont
	Kopperston, W. Va.	175	Koppers-Rheolaveur [21]
Leckie Smokeless Coal Co.	Anjean, W. Va.	400	Fairmont
Liberty Fuel Co.	Latuda, Utah	50	Link-Belt
Lillybrook Coal Co.	Lillybrook, W. Va.	75	Kanawha [12]
		80	Kanawha [12]
		125	Kanawha
			American [37]
Lorado Coal Mining Co.	Lorado, W. Va.	315	Jeffrey [22]
Lorain Coal & Dock Co.	Blaine, Ohio	320	Jeffrey [22]
Maumee Collierics Co.	Jasonville, Ind.	350	Templeton-Matthews [23]
			Link-Belt [24]
			Cent. & Mech. Ind.[18]
Midwest Radiant Corporation	West Frankfort, Ill.	20	American [25]
Moffat Coal Co.	Oak Hills, Colo.	75	Jeffrey [8]
Montana Coal & Iron Co.	Washoe, Mont.	50	Jeffrey [8]
Morris Run Coal Mining Co.	Morris Run, Pa. (2)	60	Wilmot [15]
New Jellico Coal Co.	Morley, Tenn.	40	Cent. & Mech. Ind.[18]
New River Co.	Mt. Hope, W. Va.	100	Jeffrey [26]
Old Ben Coal Corporation	Buckner, Ill.	70	American [27]
Pardee & Curtin Lumber Co.	Bergoo, W. Va.	200	Link-Belt
Pemberton Coal & Coke Co.	Affinity, W. Va.	40	Fuel Process [10]

Coal Co., Harvey, Mo.—one for $\frac{5}{8}$ x0-in. coal and another for 2 or $2\frac{1}{2}$ x $\frac{5}{8}$. In the same State, the Binkley Mining Co. of Missouri, operating a washery and McNally-Pittsburg Vissac dryer at Keota, reported that to dry 94 tons per hour of $\frac{3}{4}$-in. x $\frac{1}{2}$-mm. coal containing 17 per cent total moisture to $12\frac{1}{2}$ per cent requires 1,000 lb. of dried-coal fuel and 115 kw.-hr. of power.

In the operation of two similar dryers at Fiatt, Ill., the Truax-Traer Coal Co. found, when breaking the dryers in without the furnaces, that the total moisture of 25 per cent in $\frac{5}{16}$-in. x $\frac{1}{2}$-mm. coal could be reduced to about 17 per cent by shaking and squeezing (the latter during the flow stage of the off-and-on air current) on the screens. The Fiatt plant now is operated on the theory stated above: i.e., that the dryer should be used to heat the coal so that the heat can drive off moisture in later cooling stages (*Coal Age*, October, 1939, p. 49). On this basis, total surface moisture of around 26 per cent in $\frac{3}{4}$-in. x $\frac{1}{2}$-mm. coal is reduced to around 14 to 15 per cent with a coal temperature of around 100 to 120 deg. as loaded. The goal set up in 1939 was $14\frac{1}{2}$ per cent total moisture and 90 deg. in the car. Even lower moistures are possible but not practicable from the market standpoint.

Smoke control and truck shipments influenced design of one new plant which began to hit its stride in Illinois in 1939. For the production of "Solarite" smokeless fuel from St. Clair County No. 6 coal, the Midwest Radiant Corporation put in operation a 20-oven Curran-Knowles carbonizing plant at Millstadt. Raw coal is obtained from a complete washing and screening plant also supplying low-ash coal to the St. Louis industrial and domestic market. All shipments are made by truck and consequently the main preparation plant (designed to wash the entire mine output after reduction to 7 in. in two Jeffrey Baum-type jigs) is supplemented by a 1,700-ton storage and truck-loading plant. The Millstadt developments will be described in articles scheduled for early publication.

Midwest also installed one of the two Illinois air cleaners in 1939—a Type Y American pneumatic separator at its West Frankfort "Carbonite" plant to prepare minus $\frac{5}{16}$-in. screenings. The second air plant, comprising an American "Twin-Dex" table with a capacity of 70 tons of minus $\frac{3}{4}$-in. coal per hour, supplemented by a track hopper, crusher and blending equipment for reducing larger sizes to minus $\frac{3}{4}$, was installed at No. 14 mine, Buckner, by the Old Ben Coal Corporation.

New Bituminous Preparation Facilities in 1939*

Coal Company	Plant Location	Capacity, Net Tons of Feed per Hour	Preparation Equipment
Pennsylvania Coal & Coke Corporation	Gorman, Pa.	300	Fairmont[23]
	Gallitzin, Pa.	250	Link-Belt
Pershing Fuel Co.	Pershing, Iowa	100	Link-Belt
Pioneer Coal Co.	Arcadia, Kan.	150	McNally-Pittsburg[29]
Pruden Coal & Coke Co.	Pruden, Tenn.	50	Cent. & Mech. Ind.[18]
Pyramid Coal Corporation	Pinckneyville, Ill. (3)	800	McNally-Pittsburg[30]
Raymond City Coal & Transportation Co.	North Bend, Ohio	88	Link-Belt[20]
Reitz Coal Co.	Central City, Pa.	300	Jeffrey
	Windber, Pa.	200	Link-Belt
Reed-Rudolph Coal Co.	Logansport, Pa.	15	Deister Machine[6]
Robinson Coal Co.	Pleasanton, Kan.	75	Jeffrey[8]
Rochester & Pittsburgh Coal Co.	Homer City, Pa.	310	Link-Belt Roberts & Schaefer[2]
St. Louis & O'Fallon Coal Co.	O'Fallon, Ill.	150	McNally-Pittsburg[30]
		50	Cent. & Mech. Ind.[18]
Semet-Solvay Co.	Longacre, W. Va.	720	Fairmont[23] Deister Machine[5]
Seneca Coal & Coke Co.	Catoosa, Okla.	150	McNally-Pittsburg[31]
Sentry Coal Mining Co.	Madisonville, Ky.	....	Cent. & Mech. Ind.[18]
Shawmut Mining Co.	Brandycamp, Pa.	200	.....
Splash Dam Coal Corporation	Splashdam, Va.	40	Fuel Process[10]
Stith Coal Co.	America, Ala.	15	Deister Machine[5]
Superior Coal Co.	Mt. Claire, Ill.	57	Link-Belt
Swords Creek Mining Co.	Swords Creek, Va.	50	Kanawha Fuel Process[10]
Sycamore Coal Co.	Patterson, Va.	50	Kanawha Fuel Process[10]
Tecumseh Coal Corporation	Dickeyville, Ind. (4)	1,000	McNally-Pittsburg[32]
Truax-Traer Coal Co.	Elkville, Ill. (2)	150	McNally-Pittsburg[30]
Truax-Traer Coal Co.	Kayford, W. Va.	250	Kanawha[31]
United States Fuel Co.	Hiawatha, Utah	50	Link-Belt[33]
Utah Fuel Co.	Castle Gate, Utah	250	Link-Belt[34] Cent. & Mech. Ind.[18]
Virginia Iron, Coal & Coke Co.	Toms Creek, Va.	150	Link-Belt
Virginia Land & Mineral Co.	Richmond, Va.	30	Kanawha Fuel Process[10]
Walter S. Rae	Jackson Center, Pa.	100	Roberts & Schaefer[15]
Weirton Coal Co.	Isabella, Pa.	75	Link-Belt[35]
Westmoreland Mining Co.	Blairsville, Pa.	75	Roberts & Schaefer[2]
Wyatt Coal Co.	Laing, W. Va.	250	Kanawha
	Sharon, W. Va.	300	Kanawha
Wyoming Mining Corporation	Wyoming County, W. Va.	250	Morrow
Youghiogheny & Ohio Coal Co.	Van, W. Va.	300	Kanawha

* Also includes complete plants and installations of preparation equipment in existing structures. Where information indicates more than one cleaning unit is installed, the number is given in parentheses after the plant address.

[1] Koppers-Battelle fine-coal washer, 5/16x0-in. coal. [2] Stump Air-Flow cleaning equipment. [3] Morrow-Prins washing installation. [4] Stoker-coal plant. [5] Deister Plat-O coal-washing-table equipment. [6] Jeffrey air-operated-jig equipment. [7] Crushing, conveying and screening equipment. [8] Jeffrey washery unit. [9] Includes Morrow-Prins screenings washer, 100 tons per hour. [10] Chloride washing equipment. [11] Plat-O coal-washing tables, one for fine and one for large coal. [12] Rescreening equipment. [13] Fine-coal dewatering equipment. [14] Includes 1,400-ft. rope-and-button conveyor and additions to tipple for crushing and recirculating coal. [15] Hydroseparator washing equipment. [16] Pangborn dust-collecting installation. [17] Wilmot Hydrotator. [18] Elmore continuous centrifugal drying equipment. [19] Rescreening and blending equipment. [20] Link-Belt air-pulsated-jig washing equipment. [21] One 10-ft. Menzies cone separator (3x3/8-in. coal); also screening and sizing, and dust-removing equipment. [22] Including Jeffrey air-operated jig. [23] Designers; tipple built by Maumee. [24] Including Link-Belt trough (coarse-coal) and air-pulsated-jig (fine-coal) washers. [25] American Type Y pneumatic separator and auxiliaries. [26] Rescreening plant. [27] "Twin-Dex" pneumatic-separator equipment. [28] Including Chance sand-flotation equipment. [29] McNally-Norton automatic washing equipment. [30] Including McNally-Norton automatic washing equipment. [31] Crushing and rescreening plant. [32] Including McNally-Norton washers (one compound middlings unit) and three McNally-Pittsburg Vissac dryers. [33] Link-Belt "Roto-Louvre" drying equipment. [34] Including Link-Belt air-pulsated-jig equipment, "Roto-Louvre" dryer and blending facilities. [35] "Salvage-coal" plant, including Link-Belt air-pulsated-jig washer. [36] Screen-type heat dryer for $1\frac{1}{4}$ x $\frac{1}{4}$-in. coal. [37] American pneumo-gravity separators

Illinois Gets Washers

Chicago, Wilmington & Franklin Coal Co., in addition to conducting experiments with the Wallace low-temperature process of carbonizing dust, installed a washer at Orient No. 2 with a capacity of 200 tons of minus $1\frac{1}{2}$- or 367 tons of 6 x $\frac{7}{16}$-in. coal per hour. Blue Bird Coal Co., Carrier Mills, built a new preparation plant including a Morrow-Prins "Multi-Flow" washer, 100 tons per hour, for 3 x $\frac{1}{8}$-in. coal. Other washer installations were made by Truax-Traer, Elkville, supplemented by crushing equipment to reduce all coal to 6 in. when desired, and the St. Louis & O'Fallon Coal Co., 3 x 0-in., supplemented by an Elmore continuous centrifugal dryer, 50 tons per hour, for $\frac{3}{8}$ x 0. And in the same State, the Pyramid Coal Corporation, Pinckneyville, put in operation a McNally-Pittsburg preparation plant with a capacity of 800 tons per hour. Equipment includes three McNally-Norton washers. Provision is made for reducing all coal to 6 in. and washing the entire product, loading on seven tracks. A Link-Belt rotary railroad-car dumper permits bringing in coal from other properties by rail.

The largest plant of 1939, however, was under construction at the end of the year at new Dickeyville mine of the Tecumseh Coal Corporation, in Indiana. With a capacity of 1,000 tons per hour, this operation contains facilities for breaking all coal to 6 in. and includes three McNally-Norton washers (one a compound middlings unit) and three McNally-Pittsburg Vissac heat dryers for ¾-in. x ½-mm. coal, as well as a complete stoker-coal plant.

The first of the new Link-Belt trough washers went into the Ayrdale preparation plant, Jasonville, Ind., last year. Designed by the Templeton-Matthews Corporation and built by electric welding by the Maumee Collieries Co., this operation also washes the entire mine output after reduction to 6 in. The trough washer receives 6 x 2½-in. material and, due to the character of the coal, a middlings cut is taken high into the coal, crushed and run to an air-pulsated-jig washer with the minus 2½-in. raw coal for recovery of coal values.

Dry by Air Scrubbing

Drying at Ayrdale is a combination of "air scrubbing" and centrifugal dewatering. In air scrubbing, cold air at high velocity is drawn down through 1 x ⅜-in. washed coal on a shaker screen to do 50 to 75 per cent of the work done by 800- to 900-deg. gases in the usual screen-type heat dryers. Minus ⅜-in. coal at Ayrdale is run to an Elmore continuous centrifugal dryer, where total moisture is reduced from around 30 to 17 per cent, with a recovery of 94 per cent of the feed. In drying, also, the ash is reduced about 2 percentage points. An article on the Ayrdale plant is scheduled for early publication.

Western Kentucky was another district to get a complete washing and screening plant mechanically cleaning coal up to 6 in. in size. In this plant, designed and built by Morrow and serving the new Paradise mine of the Crescent Coal Co. (to be described in articles scheduled for early publication), a Morrow-Prins "Multi-Flow" unit for minus 2-in. coal was the only washing equipment originally contemplated. However, the interest shown by the market in washed coal resulted in a decision to install two Fuel Process Co. calcium-chloride washers, one for egg (6 x 3) and one for stove. In the same region, the Sentry Coal Mining Co. purchased an Elmore continuous centrifugal dryer to reclaim, dewater and purify effluent from a settling cone (570 g.p.m., containing about 25 per cent solids—mainly minus 10 mesh).

In Ohio, the Lorain Coal & Dock Co. installed a Jeffrey Baum-type jig and auxiliary screening equipment to wash and classify into four sizes 5 x ⅜-in. coal, bypassing minus ⅜. A similar installation was made at Lorado, W. Va., by the Lorado Coal Mining Co., except that the top size is 6 in.

Both complete new plants and individual mechanical-cleaning units to handle specific sizes characterized Pennsylvania developments in 1939. Washing units to clean specific sizes were installed by such companies as Morris Run, two Wilmot hydroseparators; Walter S. Rae, Roberts & Schaefer hydroseparator, 4 x ¼-in. coal; and Heisley, Wilmot Hydrotator, 1¼ x 0-in. coal. Stump "Air-Flow" dry-cleaning equipment was selected by Big Bend, ½ x 0, and Berwind-White and Westmoreland Mining, ¾ x 0.

Rochester & Pittsburgh Coal Co. installed a complete new Link-Belt plant at Homer City, including Stump "Air-Flow" units for ¾ x 0. And to serve Moss Creek Nos. 21 and 22 mines, Pennsylvania Coal & Coke Corporation put in a Fairmont plant with Chance sand-flotation cleaning equipment, 200 tons per hour, compared with the plant capacity of 300.

Salvage Coal From Slate

A complete plant to recover coal from mine "slate" only was installed by the Weirton Coal Co., Isabella, Pa., in 1939. Equipment includes a Link-Belt air-pulsated jig which, like all other units in the plant, is designed to function on a feed varying from 100 per cent coal to 100 per cent rock. As the "slate" enters the "salvage plant," it is broken to 4 in. in a special McLanahan & Stone quarry-type crusher and then screened to remove minus ¼-in. material, which goes directly to refuse. Capacity of the "salvage plant" is 75 tons per hour.

Like Pennsylvania, West Virginia installed both complete mechanical plants and also specific-size units, such as chloride washers by Crystal Block and Pemberton, and Roberts & Schaefer hydroseparators by H. E. Harman. American Rolling Mill Co., Nellis replaced the 14-in. Battelle launder originally developed at this property with a new 28-in. Koppers-Battelle machine with a capacity of 55 tons of ⅜ x 0-in. coal per hour. Greater capacity was the goal, and the new unit includes improvements developed at the Royalton (Ill.) plant of the Franklin County Coal Corporation, Inc. The Koppers Coal Co. installed the first unit of a coal-washing plant at its Eagle-seam mine, Kopperston, consisting of a 10-ft. Menzies cone separator with a capacity of 175 tons of 3 x ⅛-in. coal per hour.

Semet-Solvay also joined the mechanical-cleaning ranks with a Fairmont plant at Longacre, W. Va. New facilities included a dumping installation, 720 tons per hour, and a washing plant, 400 tons per hour, including a 13½-ft. Chance cone for 4 x ¼-in. coal, 335 tons per hour, and a Plat-O coal washing table, 15 tons per hour.

Heat-Dry Fines on Screen

Experiments to develop a satisfactory cleaning process for minus ¼-in. coal from the War Eagle, or Beckley, seam were carried on by the Pond Creek Pocahontas Co. at its No. 4 mine, Bartley, W. Va. Heat-drying the coal to not over 4 per cent moisture was a corollary, and for this purpose a heat-drying screen using new principles was supplied by Koppers-Rheolaveur. To eliminate loss of the fine coal and cut down excessive bed resistance resulting when drying gases are drawn down through the coal, the gas flow was reversed to go up through the screen and coal.

The drying unit comprises a balanced two-deck high-speed screen in a gas-tight hood. The upper deck is fitted with a finely perforated stainless-steel screen and the lower consists of a series of overlapping stainless-steel shelves arranged to permit the passage of gases and catch any siftings of fine coal through the upper deck.

Coal handled, through a ¼-in. square-mesh screen, contains approximately 8 to 10 per cent of minus 48-mesh material. Moisture averaged 10 per cent. Operation was checked under a variety of tonnage and moisture conditions, of which the following are reported as typical: dry feed per foot of screen width, 5.5 tons per hour; surface moisture, per cent by weight, 11.5; surface moisture, dried coal, 2.90; dry feed, 10 tons per foot; surface moisture, 6.75; surface moisture of dried product, 2.32. Inlet gases ranged from 950 to 1,100 deg. F. and exhaust gases, about 220 deg. Temperature of the dried coal ranged from 110 to 130 deg. F.

Screen-type heat-drying units for 1¼ x¼-in. coal, supplied by the Kana-

wha Mfg. Co., were installed at Mines No. 14 and 20 by the Island Creek Coal Co. Each unit has an hourly capacity of 200 tons.

In Virginia, chloride washers were installed by Splash Dam, Swords Creek, Sycamore and Virginia Land & Minerals. Tennessee, among other projects, put in two Elmore continuous centrifugal dryers. The New Jellico Coal Co. unit, it is reported, reduces the surface moisture in ¼ x 0-in. coal from a maximum of 35 to 6 per cent or less. Another unit was installed by the Pruden Coal & Coke Co. to handle ⅜ x 0-in. coal.

Alabama continued to add to washing equipment in 1939, sticking mostly to jigs and tables, such as an Elmore jig and Plat-O table at the Pratt-seam operation of the Stith Coal Co., a Plat-O table by the Brookside-Pratt Mining Co. at Winfield, and two jigs with automatic feed gates at the Bradford operation of the Alabama By-Products Corporation.

Construction of tipples and screening plants was no less active than installation of mechanical cleaners in 1939. Improved screening or picking, the production of additional sizes, particularly for the stoker trade, and better loading facilities were the usual objectives. At Castle Gate, Utah, for example, the Utah Fuel Co. installed two new box-car loaders and enlarged conveying equipment to take care of an increased tonnage. Three box-car loaders and revisions in picking facilities and loading booms marked developments at the company's Clear Creek property. In the same State, the Independent Coal & Coke Co., as one of a number of companies installing equipment for the production of small sizes, placed in service a new McNally-Pittsburg rescreening and blending plant with a capacity of 120 tons of minus 1⅝-in. coal per hour, separating the feed into four sizes.

Another in the growing list of plants designed to reduce the entire mine output, when desired, to stoker was the Jefferson No. 20 operation of the Consolidated Coal Co., Nason, Ill., where equipment includes a Dings magnetic pulley, primary and secondary crushers, and a complete Robins rescreening, dedusting and mixing plant for minus 2-in. coal comprising preliminary Gyrex sizing screens, Tyler 400 electric screens for dedusting minus ⅜-in. coal at 10-mesh and assembly belts discharging into proportioning gates permitting the production of stoker sizes with all fractions definitely controlled as to percentage. With all the equipment in service, it is possible to crush the entire mine output, expected to be 400 tons an hour, to minus ⅜-in. and dedust it at 10-mesh.

Provision for crushing all coal to minus 2 in. and rescreening it to nut, stoker and slack also was incorporated in the new tipple of the Shawmut Mining Co., Brandycamp, Pa. (*Coal Age*, October, 1939, p. 56), which includes a General Electric magnet for tramp iron, facilities for percentage mixing and "Coalaid" dustless treatment.

Pennsylvania also erected a number of complete new tipples, including a Jeffrey 4-track installation for coal, cuttings and rock by the Ebensburg Coal Co., Colver, Pa. The plant includes a 125-ton cuttings bin, five Jeffrey-Traylor vibrators, a Bradford breaker, mixing equipment, etc. Capacity is 525 tons per hour. At the other end of the scale, a 50-tons-per-hour all steel truck-and-rail tipple was built for the George E. Miller Coal Co., Joller, by Heyl & Patterson. Equipment includes a bar-type scalping screen preceding a crusher, regular sizing screens, and mine-run, slack and stoker bins. A single track permits rail loadings from any one of the three bins at a time. Also, all three bins can be used for truck-loading when desired.

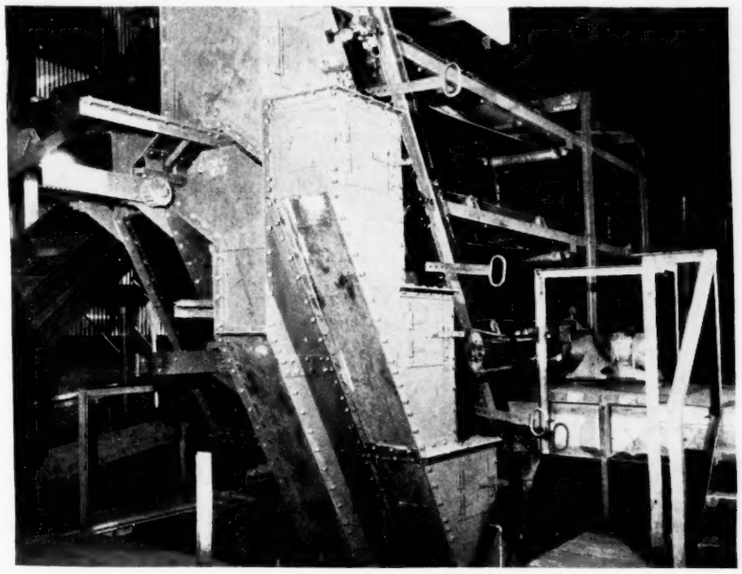
Crushing and conveying revisions in 1939 were exemplified by Fairmont installations by the Dawson, Consolidation, Glogora, Elk Lick and Christopher Mining companies in West Virginia. Among the tipples in that State was that of the Colcord Coal Co., Stickney, employing a double-deck Gyrex screen with intermediate collecting deck for making 5-in. lump, 5 x 3-in. egg, 3 x 1¼-in. nut and 1¼-in. slack. Sizes are distributed to the various loading tracks by a Robins shaking distributing chute.

Other West Virginia tipple installations, by Kanawha, included Chafin-Jones-Heatherman, Kelleys Creek, Wyatt and Youghiogheny & Ohio. Kanawha rescreening plants included a crushing, sizing and loading installation (Jeffrey crusher, three Symons screens, conveyors and bins, 300 tons per hour, stove, nut, pea and slack) for Truax-Traer.

Kentucky installations included a new plant by Happy Collieries, at Warren. A rope-and-button conveyor brings coal to this 4-track installation, and the headhouse includes a 125-ton storage bin and automatic scales for handling drop-bottom cars. The entire headhouse is operated by one man.

In Virginia, the Blue Diamond Coal Co., Bonny Blue, installed a Morrow stoker-coal plant, comprising vibrating screens, hoppers, chutes and auxiliary equipment for handling 2 x 0-in. coal at 300 tons per hour. And the Virginia Iron, Coal & Coke Co., to increase the capacity of its Monarch tipple, provide greater flexibility in screening and make possible the loading of six sizes simultaneously, installed four Link-Belt vibrators, a Link-Belt stoker-coal sizer, Jeffrey belt elevator and apron feeder and a 70-ton domestic-coal storage bin.

Not a Rube Goldberg invention but a nest of proportioning gates in the new Jefferson No. 20 stoker-coal plant, Nason, Ill.



MILESTONES IN COAL PREPARATION

TABULATED below are the major steps in the progress of coal preparation in the United States, as far as they could be ascertained, from the time the first coal man did something more than just pick out the big lumps in the mine to the present day. Included are coal washing, screening, drying, crushing, dustless treatment, loading and other steps in the preparation process.

1741—Anthracite believed to have been mined by the Indians as early as this year; bituminous mining believed to have started near Richmond, Va., about this time.

1830—First preparation scaffold built on the surface in the anthracite region. Only lumps, however, are brought to the surface, where they are placed on a perforated plate and broken with sledges.

1830—Hand rake, with teeth giving openings of about 1¾ in., introduced in the mines; used until about 1850 or possibly as late as 1869, when it was found possible to utilize pea-size anthracite.

1841—First anthracite breaker, forerunner of today's large and expensive structures, erected near Minersville, Pa., by Gideon Bast; equipped with first power-driven crusher rolls patented the same year by Joseph Batten. Bast installed revolving screens and drove them with a steam engine, the first use of power for this purpose instead of hand labor.

1850—First patents dealing with dry cleaning in this year.

1860—Several crude jigs tested near Pottsville, Pa., between this year and 1865.

1869—First bituminous washery, using a piston jig, built at Alpsville, Pa., to clean slack.

1870—First picking table in the anthracite region, Hill & Harris colliery, Mahanoy City, about this time.

1871—Second bituminous washery, Osterspey jig, differential motion, flap valves on pistons, completed at East St. Louis, Ill., by Illinois Patent Coke Co.

1873—Bradford breaker, designed for anthracite use, patented.

1873—Stroh jig, Jeddo breaker.

1875—First patents on mechanical pickers for anthracite issued.

1875—Probably first extensive washing (anthracite) done by Lehigh Navigation Coal Co. in Panther Creek Valley.

1882—Sluice washer installed by St. Bernard Coal Co., western Kentucky.

1881—Reciprocating screen (probably bar type) for "washing" slack reported in Wilmington field of Illinois.

1888—Tub washer developed by Howe.

1890—First U. S. Luhrig jig washery, City Furnace, Alabama.

1890—First bituminous shaker screen (single deck), installed at Slope No. 4, Pratt mines, Tennessee Coal, Iron & R.R. Co., Alabama, by Erskine Ramsay.

1890—Shaker-screen development starts in anthracite about this time, motivated by desire for equipment to handle large quantities of material with higher effieciency and less breakage. Anthony one of first—preceded, however, by high-speed roller mounted and Coxe gyratory unit. Flexible-arm, or Parrish-type shaker, later widely installed at bituminous mines, developed in succeeding years.

1891—Model of bumping table developed by A. C. Campbell tried by St. Bernard Coal Co.

1891—Wilminton Washed Coal Co., Illinois, installs first Howe tub washer.

1891—First Bradford breaker installed in a bituminous preparation plant.

1892—First Robinson washer installed at Slope No. 1, Tennessee Coal, Iron & R.R. Co., Pratt City, Ala., by Erskine Ramsay.

1894—Forrester jig used in Illinois.

1895—Experimental Ottumwa box-car loader installed at Ottumwa (Iowa) mine, Phillips Fuel Co., followed by second workable machine, White Breast Fuel Co., Forbush, Iowa.

1898—Stewart pan jig installed by the Big Muddy Coal & Iron Co., Illinois.

1899—Maltby Coal Co., Braidwood, Ill., installs first Scaife trough washer.

1899—First Christy box-car loader.

1899—Pardee spiralizer, or mechanical picker for anthracite, patented.

1900—Elmore jig, plunger with flap valves to reduce suction, developed about this time.

1904—American jig installed in Illinois.

1904—Drainage pits for washed coal installed by the Cambria Steel Co., Johnstown, Pa., about this time.

1906—Stag Canon Fuel Co., Dawson, N. M., experiments with coal-washing on Willfley ore-dressing table.

1906—New Century jig installed in Illinois.

1907—Shannon jig installed in Illinois.

1908—Probably first hinged loading boom (Jeffrey) installed by Empire Coal & Coke Co., Landgraff, W. Va.

1909—Foust and Pittsburgh jigs installed in Illinois.

1910—Montgomery jig offered.

1910—Flexible-arm shaker brought from anthracite to Illinois for fine-sizing about this time.

1911—Stag Canon Fuel Co. installs large Wilfley concentrating table, forerunner of 24 "Massco" coal-washing tables, based on the Willfley.

1912—Old Ben Coal Corporation, Illinois, installs Pardee spiralizers.

1912—Marcus screening and picking equipment introduced from England.

1911—Wendell (developed in Illinois) and American, or Elmore (developed at Steelton, Pa.), centrifugal dryers brought out about this time.

1915—Variations in shaker screens begin to appear shortly before this year, including the Krehbiel horizontal and "Anti-Gravity" upwardly inclined types.

1916—Stag Canon Fuel Co. installs first Dorr thickener.

1916—Peterson pendulum, or short-suspension screen makes its appearance.

1916—Lehigh Navigation Coal Co., anthracite, begins installation of a number of cone-type separators for washing silt, adapted from the Robinson washer.

1916—Stag Canon Fuel Co. first installs Deister-Overstom "Diagonal-Deck," Butchart, Plat-O and Overstrom coal-washing tables (part in 1917).

1918—First experiments on coal flotation at Mellon Institute.

1918—First American pneumatic separator, developed from the Sutton, Steele & Steele grain separator, installed by McAlester-Edwards Coal Co., McAlester, Okla.

1919—St. Louis, Rocky Mountain & Pacific Co., Raton, N. M., installs first commercial plant using American pneumatic separators.

1919—First magnetically operated vibrating screen used on coal at Steelton, Pa.

1919—Ruggles-Cole kiln-type heat dryers used by Cottonwood (Mont.) Coal Co.

1920—Carpenter centrifugal dryer developed by H. B. Carpenter, superintendent, byproduct plant, Colorado Fuel & Iron Co., about this time.

1920—So-called "needle" breakers (Sauerman, etc.) in use at this time.

1920—Electric screens employing motor with unbalanced weight developed.

1920—Deister-Overstrom "Diagonal-Deck" coal-washing tables installed at Wadesville colliery, Philadelphia & Reading Coal & Iron Co., and Loree colliery, Hudson Coal Co.

1920—U.S. Bureau of Mines begins studies of froth flotation.

1920—Tests of Trent amalgam process begin.

1921—Hudson Coal Co. starts experiments with Conklin heavy-medium separation employing magnetite, using a Dorr thickener for its recovery and recirculation.

1921—First Chance sand-flotation cleaning equipment installed at West Nanticoke colliery, Staples & Bell.

1922—Miller screen developed by C. L. Miller, Scottdale, Pa., about this time. Screen and drive mounted on long spring pedestals on separate foundations to prevent shock and vibration in plant structure.

1923—First Peale-Davis pneumo-gravity separator, providing for air-cleaning an unsized feed up to 4 in. with a secondary table to reclean refuse from the primary, installed by Peale interests in central Pennsylvania.

1924—Rheolaveur process introduced from Europe with installation of fine-coal washers at Baltimore colliery, Hudson Coal Co.

1924—Trent amalgam process used commercially at Newark, N. J.

1924—Menzies hydroseparator introduced.

1924—First installations of Carpenter dryers.

1924—Scraper-type rescreening loading boom (Link-Belt) patented.

1925—Hydrotator washer brought out after experiments at Oak Hill colliery, anthracite.

1925—Rheolaveur washing plant installed by American Smelting & Refining Co., Cokedale, Colo.

1925—First bituminous Chance sand-flotation plant installed by Rock Hill Coal & Iron Co., Mt. Union, Pa.

1925—Trend toward washing larger than 3-in. starts about this time.

1926—Menzies hydroseparator installed in bituminous fields.

1926—Laughlin filter introduced about this time.

1926—Washery sludge treated by froth flotation, Snoqualmie, Wash.

1926—Three operators in low-volatile field of southen West Virginia start dustless-treatment cycle by applying calcium chloride to coal.

1926—Heating plant for warming oil for dustproofing coal used by Benjamin H. Card; previously spraying had been done with cold oil.

1928—Baum-type jig (Link-Belt Simon-Carves) introduced in United States with installations by Jones & Laughlin Steel Co., Pittsburgh, Pa., and Central Indiana Coal Co., Allendale No. 2 mine, Indiana.

1928—Experiments with Arzinger oil-flotation process in Alabama, followed by installation at Natalie (Pa.) colliery, Colonial Coal Co.

1928—Square-topped Chance cone for cleaning fine sizes developed.

1928—Probably first bituminous shaking picking table installed by Pittsburgh Coal Co. Bituminous industry also developed the smooth-topped apron-type table.

1930—With development of the R separator about this time, American air tables are offered to clean a 3x0-in. feed, either on a single table or on a series of tables re-treating progressively smaller fractions.

1930—First air-sand cleaning units, developed by Fraser and Yancey, installed by Allegheny River Mining Co., Cadogan, Pa.

1930—Dorr and Oliver filters installed by Pittsburgh Coal Co., followed by a Genter filter at Clairton, Pa., and an American filter at Nemacolin, Pa.

1931—Old Ben Coal Corporation, Illinois, dustless-treats coal with paraffin.

1931—Birtley-type aspirating equipment for dedusting coal installed by Chicago, Wilmington & Franklin Coal Co., West Frankfort, Ill.

1931—First Norton washer in U. S. installed by Montevallo Coal Co., Alabama; later made in U. S. as McNally-Norton washer.

1931—D-L-O dryer, a modification of Dwight-Lloyd sintering machine, developed at Friar Tuck mine, Sherwood-Templeton Coal Co., Indiana.

1931—Cumberland mechanical pickers (W. W. Stevenson) installed by Steinman and Splashdam coal companies, Virginia.

1931—Probably first preparation plant using vibrating screens only erected by Syracuse Mining Co., Pomeroy, Ohio.

1932—Experimental Wuensch "Differential-Density" washer, using material in coal to form a heavy-gravity cleaning medium, installed by Pittsburg & Midway Coal Mining Co., West Mineral, Kan.; followed by full-sized commercial unit.

1932—First major installation of Stump "Air-Flow" cleaners by Barnes Coal Co., Barnesboro, Pa.

1932—Norton pick breaker introduced from England.

1933—Method of suspending shaker screen and drive on platform hung from tipple structure and free to move about 1 in. either way developed by J. W. Murry and used by Consolidation Coal Co.

1933—Bixby heat dryer installed at new Farmington (Ill.) cleaning plant of Midland Electric Coal Corporation.

1934—"Hot-oil" process of dustless-treating coals installed by Franklin County Coal Corporation, Inc., Royalton (Ill.) No. 7 mine.

1934—Denver flotation cells installed at West Mineral, Kan., by Pittsburg & Midway Coal Mining Co. to clean 2-mm. material from a Dorr thickener.

1934—Algar aspirating-type dedusting units installed by Peabody Coal Co., Harco, Ill.

1934—Jeffrey Baum-type air-operated and Jeffrey diaphragm jigs introduced.

1934—First Brown-Fayro high-pressure unit for cold-oil spraying of coal, winter and summer, installed at the Champion cleaning plant, Pittsburgh Coal Co.

1935—Llewellyn (Koppers-Llewellyn) jig developed; first installation, Cranberry No. 2 mine, New River Co., Skelton, W. Va.

1935—Several Fuel Process Co. calcium-chloride washers installed in low-volatile fields of southern West Virginia.

1935—Vissac (McNally-Vissac) jig introduced from Canada with installations by Northwestern Improvement Co., Roslyn, Wash., and Snow Hill Coal Corporation, Terre Haute, Ind.

1935—Retractile-type picking table with integral rescreen mounted on wheels to permit moving it back and forth to discharge to either loading boom or mixing conveyor included in Morrow tipple for Red Jacket, Jr., Coal Co., Wyoming, W. Va.

1935—Pittsburgh Coal Co. installs 12 Denver flotation units to clean material containing 80 per cent minus 200-mesh.

1936—First Link-Belt patented combination washers (trough washers with air-pulsated jigs) installed in three plants of the Island Creek Co., Logan County, W. Va.

1936—Link-Belt "Roto-Louvre" dryer included in new Willow Grove No. 10 plant, Hanna Coal Co. of Ohio.

1936—Chain-mat rescreening conveyors included in Fairmont plant of Harvey Coal Corporation, Harveyton, Ky.

1936—Water used on Tyler electric dedusting screens by Enos Coal Mining Co., Oakland City, Ind., to increase efficiency.

1936—First commercial plant employing du Pont sink-and-float process with heavy-gravity liquids installed at Weston breaker, Weston Coal Co., Shenandoah, Pa.

1937—First "Modernistic" preparation plant (McNally-Pittsburg) installed by the Sentry Coal Mining Co., Madisonville, Ky.

1937—National Mining Co., Sygan, Pa., installs Robins shaking chute to distribute sizes made from mine-run on vibrating-screen equipment.

1937—First Koppers-Battelle launder installed by Nellis (W. Va.) Coal Corporation to clean minus 5/16-in. coal.

1937—New York Coal Co., Chauncey, Ohio, and Knox Consolidated Coal Corporation, Bicknell, Ind., install first Morrow-Prins "multiflow" washing units.

1937—Raven Red Ash Coal Co., Raven, Va., installs probably first so-called self-contained washery (Jeffrey).

1937—First preparation plant equipped for dust control by Pittsburgh Coal Co., Negley, Ohio. New air plant added in this year made dustproof by inclosing all conveyors, tables, screens, etc., supplementing this with a vacuum-sweeping system, serving both the new air and the older washing sections.

1937—Heat-drying screen developed by Island Creek Coal Co.; similar unit installed in Koppers-built plant of United Electric Coal Cos., Canton, Ill., in 1938.

1937—First Vissac (later McNally-Pittsburg Vissac) heat dryer installed in United States by Northwestern Improvement Co., Roslyn, Wash.

1937—Storage conveyors installed to permit car-changing without stopping tipple, Kemmerer Coal Co., Wyoming.

1937—Elk Horn Coal Corporation installs Fairmont plant permitting entire output to be broken to stoker sizes.

1937—Link-Belt cooling table installed after Ruggles-Cole dryer by Roslyn-Cascade Coal Co., Washington.

1937—Raw-coal blending plant with capacity of 1,000 tons installed in connection with washing plant at Isabella (Pa.) mine of Weirton Coal Co.

1938—American "Twin-Dex" separators installed by Upper Buchanan Smokeless Coal Co. and Ringgold Coal Co.

1938—First bituminous Menzies cone separator installed by Franklin County Coal Corporation, Inc., Royalton, Ill.

1938—First of the new-type Elmore continuous centrifugal dryers, also used for reclaiming, dewatering and purifying slurry, installed by the Central State Collieries, Inc., St. David, Ill.

1938—Blending bin holding 1,500 tons included in new Mather (Pa.) combination preparation plant, Pickands, Mather & Co.

1938—New air-sand cleaning equipment, including launder-type separators without obstructions and revolving sand lift, developed.

1939—Weirton Coal Co., Isabella, Pa., installs salvage coal plant, including Link-Belt air-pulsated jig, for recovering "salvage coal" from "mine slate" (plant does not rewash or re-treat production from another preparation unit but operates solely on a mine product).

1939—Truax-Traer Coal Co., Piatt, Ill., develops theory of first heating coal and then cooling it to eliminate moisture, along with shaking and squeezing of the coal on the screens in McNally-Pittsburg Vissac dryers.

1939—First Link Belt trough washer installed in new Ayrdale plant of Maumee Collieries Co., Jasonville, Ind.

1939—"Air scrubbing," based on use of cold air current to scrub moisture off coal on a shaking screen, installed at Ayrdale plant.

1939—Consolidated Coal Co., Nason, Ill., installs complete facilities for breaking down, screening and remixing in desired proportions the entire plant output in making stoker sizes.

COAL USES MORE POWER

And Improves Maintenance

As a Result of 1939 Mechanization Gains

IMPROVEMENTS in direct-current supply and distribution to serve mechanical loading loom above other electrical and mechanical developments in 1939. In point of actual installations, mercury-arc rectifiers pushed further ahead in the substation field and several are on order for delivery this year. Introduction and rapid adoption of the shuttle car gave bottled electricity a better grip on secondary haulage. Few strikingly new features could be noted in equipment maintenance but the general efficiency with which it was practiced throughout the industry contributed its share to the increasing production per man.

Generating Capacity Added

Mine-generated power barely held its own in competition with purchased power. At Pageton, W. Va., the Page Coal & Coke Co. scrapped its a.c.-d.c. power plant, installed originally in 1904, in favor of purchased power to secure a "reduction in power costs and increase the general efficiency of the mine." On the other side of the ledger, the Centralia Coal Co., Centralia, Ill., which hoists with steam at its No. 2 mine and up to this year generated d.c. power but purchased a.c. for outlying substations, displaced its eight hand-fired boilers with one 600-hp. spreader-stoker-fired boiler and installed a 750-kw. mixed-pressure turbine which generates a.c. and operates almost entirely on exhaust from the hoist, pumps and d.c. engine-generators. The boiler is equipped with automatic control and the fuel is ¼ x 0-in. carbon; and to supply the increased need for power resulting from mechanical mining, the Consolidated Coal Co. added a 1,500-kw. turbo-generator to the original power-producing facilities (1,500-kw.) at its Jefferson No. 20 mine, Nason, Ill., which it took over and reopened in 1938.

A 750-kw. turbine was added in 1939 to the relatively new (1937) Huber power plant of the Glen Alden Coal Co., in the anthracite field, thus effectuating a contemplated increase in steam pressure to 600 lb. per square inch and an increase in temperature to 632 deg. F. This turbine is of the automatic extracting-condensing type from which 120,000 lb. of steam hourly can be bled for colliery needs. Steam is generated in four 40,000-lb.-per-hour Stirling boilers using No. 4 buckwheat on Coxe traveling grate stokers (*Coal Age*, May, 1939, p. 37).

D.C. Substations Increased

Numerous d.c. substations were installed during 1939 to increase total capacity and bring the power source closer to the center of load. In some cases entire new units and control boards were purchased; in others, existing units were moved "as is" and, in still other cases, old units were rebuilt and reequipped with modern controls. One manufacturer of Ignitron rectifiers reported a total of thirteen mercury units sold during the year: six were for surface installation to supply 550 volts, one for a surface installation to supply 275 volts and six for portable underground 275-volt service. Several of these Ignitron units are due to go into service early this year.

The installations will include the first unit to go into the New River field of West Virginia. It is a 500-kw. 600-volt stationary Ignitron which will feed Summerlee and Lochgelly mines of the New River Co. Other Ignitron units go into service in Ohio and western Pennsylvania. To supply 275 volts d.c. to a mine of the Pocahontas Fuel Co., Grassy Springs, Va., the Appalachian Power Co. installed a 400-kw. Ignitron—the second rectifier to supply Pocahontas Fuel mines. The first, still in service, is a multiple-anode tank type installed in 1927 by the power company to supply Rolph mine, Worth, W. Va.

Mines Adopt Rectifiers

Page Coal & Coke Co. last October installed a 500-kw. 550-volt tank-type rectifier formerly used in street railway service. As a standby for this rectifier, which is the main source of d.c. power, a 300-kw. motor-generator was installed in a general change from mine-generated to purchased power. Up to this year, only General Electric and Westinghouse offered single-anode rectifiers and these incorporate Ignitron tubes. Late in 1939, Allis-Chalmers announced its "Excitron" single-anode rectifier without Ignitron tubes. Higher efficiency at 275-volt operation is the principal advantage of all single-anode rectifiers as compared to the multiple-anode type.

At a mine in western Pennsylvania controlled by the Imperial Coal Corporation, $20,000 was invested in a new 200-kw. motor-generator substation complete with a.c. feed lines. At Powhatan, Ala., the Franklin Coal Mining Co. spent $10,000 installing an additional 200-kw. substation unit to increase production. The same interests reported complete electrification of the mine of the Alta Coal Co.,

Inc., Sumiton, Ala., involving nearly $100,000 and including a central pumping station to permit doing all mine pumping on the off-peak.

A motor-generator substation was installed underground at the Clear Creek mine, Utah Fuel Co., as part of a mechanization program. Power at 4,000 volts is conducted 8,000 ft. underground by a No. 2/0 cable. It is the first use of a.c. underground in that mine and the project included changing the main hoist from d.c. to a.c. At Somerset mine of the same company, in Colorado, an additional 150-kw. motor-generator substation was installed.

Capacitors Cut Cost

In helping reduce the unit cost of purchased power the capacitor has assumed the status of standard equipment where sufficient power-factor correction is not available from synchronous-motored machinery. At the Page Coal & Coke mine, capacitors to maintain average power factor at unity were included in the installation of rectifiers and other change-over equipment. During the year, General Electric announced new individual box-type capacitors with internal discharge resistances and fuse clips in a dust-tight box on top of each section.

Demand limiting continued among the controversial questions. Some officials swear by it and others say it has no place because of the fundamental requirement of furnishing unrestricted continuous power to mechanical operation. Evidences point to its increasing use, however, and several companies revamped their demand meter control layouts. New recruits in the ranks of demand limiting were the Sycamore Coal Co., Cinderella, W. Va., and the Sycamore Coal Corporation, Buchanan County, Virginia, which installed automatic limiters in all substations.

With the passing of 1939, mechanized mines with trolley wires no larger than No. 4/0 became exceptions. Outside of some 550-volt operations, wire of the size nominally termed No. 6/0 (usual actual size, 300,000 or 350,000 circ.mil) dominates the haulways of all but the smaller mines. In the large mines, Fig. 9 deep-section grooved wire of 400,000-circ.mil area is no longer an unusual sight.

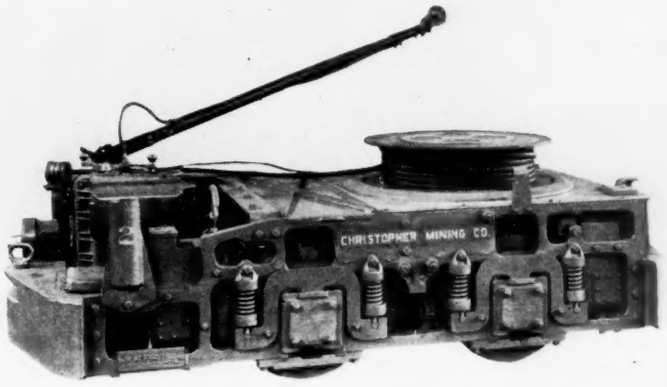
Rail welding increased sharply in 1939. Mines of the Hanna Coal Co. of Ohio now have five miles of Thermit-welded track and two additional miles is projected (*Coal Age*, December, 1939, p. 145). At the end of the year, No. 2 mine of the Pursglove Coal Co. (northern West Virginia) had nearly 14,000 ft. of bronze gas-welded track, while in No. 15 mine more than 18,000 ft. of track had been joined by steel arc-welding.

Like southern Illinois, southern West Virginia did a limited amount of track-welding for several years, but in 1939 several additional companies adopted the practice. At the Puritan Coal Corporation, 4,000 ft. of 56-lb. main-line rail was Thermit-welded. In Killarney mine, Lillybrook Coal Co., the total was 2,500 ft. of 60-lb. track. Arc-welding, making use of existing angle bars, was applied to one mile of 60-lb. main line in a mine of the Raleigh Coal & Coke Co.

In Buchanan County, Virginia, at its Buccaneer mine, the Sycamore Coal Corporation Thermit-welded 3,000 ft. of 60-lb. rail. Electrical conductivity was given as the principal reason for that method of rail joining but reduced track-maintenance cost also was an important consideration. After tests of Thermit-welding beginning in 1936, officials of the New Orient mine, Illinois, have decided that eventually all main-line track will be welded. At the close of the year 2,000 ft. of welded track was in service (*Coal Age*, January, 1940, p. 35).

Another electrical distribution item, but having to do more with continuity and safety than with eliminating power loss, which gained momentum in 1939 after half-hearted attention for a decade or more, was vulcanizing trailing cables for mining machines, loaders and cable-reel locomotives. Except in very gassy mines, where only vulcanized splices are used, the general practice is to allow three or four temporary splices before the cable is removed and sent to the vulcanizing shop. Several mines of the Island Creek Coal Co. were equipped with steam-electric vulcanizers in 1939. Another notable instance is that of the Koppers Coal Co., Federal No. 1 mine, where all cables are No. 2 concentric, 450 ft. in length and vulcanizing is done at a surface substation two miles from the plant (*Coal Age*, December, 1939, p. 118).

Notable progress in wiring and controls for conveyor mining was made during the year. The changes were aimed at convenience and also at elimination of shock, electrical burns and gas ignitions. On a conveyor system installed to rush the driving of a six-heading entry to new territory at Dolomite No. 3 mine, Woodward Iron Co., Alabama, for example, all controllers are permissible, branch lines take off from Ohio Brass fused permissible junction boxes; the Miller cable connectors, in every case, are vulcanized to the cables, cut to length at the factory. Chains and padlocks prohibit accidental or ill-advised opening of the connectors (*Coal Age*, July, 1939, p. 39).



Single-motor 5-ton gathering locomotive for narrow places and sharp turnouts.

As to the question of the best voltage, 220 or 440, for a.c. underground conveyor drives, the past year brought no definite answer. Efficiency calls for 440 and some engineers are of the opinion that with proper equipment and grounding that voltage can be handled as safely as 220. A few 440-volt conveyors were installed, but the 220-volt jobs held the lead. Describing a fatality from contact with a 440-volt line, the third-quarter report of the

West Virginia Department of Mines, p. 28, states, "Four hundred and forty volts should not be used in working places."

For tipple and preparation-plant motors, 440 volts found more takers than 220. Westville No. 24, an outstanding new preparation plant of the Peabody Coal Co., Catlin, Ill., uses 440 volts. All wiring is in rigid conduit and each circuit is of sufficient oversize to permit installation of the next larger standard size of motor. As a further provision for changes in preparation-plant equipment or capacity, the conduits will accommodate circuits made up of wires of the next larger sizes. Full sequence control is used, but it can be cut out and each motor started individually (*Coal Age*, July, 1939, p. 48). In the anthracite region, the new Pittston No. 9 breaker which went into service in January, 1939, contains 440-volt motors.

Two 400-kw. 575-volt Ignitron rectifiers in a surface substation.

Electricity bottled in storage batteries made a big jump as a result of a substantial increase in rubber-tired secondary haulage. Close to 100 Fletcher tractor-trailer units and Joy shuttle cars were in the hands of mining companies at the end of the year. Shuttle cars of 5 to 6 tons capacity are equipped with 48-cell (96-volt) batteries with capacities of 300 to 350 amp.-hr. Motor-generator sets delivering 10 kw. at 132 volts are used for the most part for charging the shuttle-car batteries. One set is capable of serving two shuttle cars working two shifts if equipped with extra batteries.

Judging from reports from the Rocky Mountain region, storage-battery locomotives more than held their place in service haulage. In Colorado, two battery locomotives were installed as additions to other battery equipment in the Somerset mine of the Utah Fuel Co. In the same State two storage-battery locomotives and two trolley locomotives were installed at Calumet No. 2 mine, Calumet Coal Co. (Utah Fuel Co.).

Cables installed in boreholes, shafts and underground passages were largely of the rubber and braid types without metallic armor, but for jobs where the greatest reliability is desired some engineers still specify the armored type. Cables of great lengths continue to be installed in boreholes supported by the conductor only, and the year was devoid of reports of failures of that type of installation. A 1939 example of a long three-phase cable supported by the conductors is a No. 1 tellurium and Versatol General Electric cable in an 844-ft. borehole feeding 4,000-volt power to a substation in Mine No. 3 of the C. H. Mead Co., East Gulf, W. Va. (*Coal Age*, July, 1939, p. 62).

For providing protected cableways for 600-volt d.c. borehole cables the Vesta Coal Co., California, Pa., cast three 2½-in. conduits in the concrete filling of each of two 10-in. boreholes 513 ft. deep. Cables are 1,500,000-circ.mil units and the hot ones (negatives in this case because of the use of rectifiers) are rubber-insulated. Positive conductors are bare copper.

In mine-locomotive design the first radical departure of many years was realized when a 21-ton, 21-m.p.h. (full load), 40-m.p.h. (top speed) "Axless" 8-wheel locomotive was put into service early in 1939 by the Hanna Coal Co. of Ohio. Made by Differential, this locomotive has four Westinghouse 90-hp. motors and Westinghouse control. Two tandem wheels on a side constitute a pair and the pair with its driving motor swivels on an individual king post. Parallel bars at the ends tie opposite pairs together, thus forming a truck whose wheels swivel together to go around curves. The design permits of a long total wheelbase which minimizes the effect of weight transfer so that drawbar pull is greater than with conventional two-axle locomotives of the same weight. Total motor horsepower per ton of locomotive weight is 17.1, which exceeds by more than 50 per cent the motoring of heavy-powered two-axle locomotives.

Run 180 Miles a Day

An exceptional travel per day, 180 miles, is the stint of two new General Electric 15-ton locomotives operating three shifts per day over a 3½-mile total haul at Robinson Run No. 2 mine, Christopher Mining Co., Morgantown, W. Va. Wheel diameter is 36 in., journals are Timken-equipped, and the controls are contactor type with dynamic braking. These locomotives are rated at 6,500 lb. drawbar pull at 10 m.p.h. Track steel is 85-lb. Grades average 2 per cent against the loads, with the maximum 2½ per cent, and a trip consists of sixteen cars (car, 6,500 lb.; coal, 10,000 lb.).

Among the gathering-locomotive trends and developments reported by Westinghouse are the use of a single-motor 5-ton locomotive for use in narrow places and on sharp turnouts, and new controllers and brakes which make it possible for the motorman to follow a loading machine more readily. The controllers are single-handle reversing type, enabling the motorman to reverse with a single movement. Brakes are of the single-pull lever type which can be set or released with a single movement.

Maintenance methods were revamped at numerous mines new in the ranks of mechanical loading. That it is possible practically to eliminate

delays due to breakdowns now is widely appreciated in the industry. Shop facilities have been materially improved and mechanics of a higher class developed or attracted by better facilities and more systematic methods. The year offered evidences that improved designs, better materials and finer workmanship in manufacturing mining equipment and in its maintenance can work wonders in increasing reliability.

Two distinct trends in equipment used in mine shops became apparent during the year. Some companies with mines close to commercial repair shops found it possible to get along without machine tools, such as lathes. Other companies with mines not convenient to commercial shops and certain companies already equipped with central shops serving close groups of mines found it advisable to add improved maintenance tools. The extensive use of heat-treated shafts and of anti-friction bearings, for instance, calls for grinding and polishing equipment hardly justified a few years ago. From a review of recent developments comes this conclusion. Either leave the machine work to a commercial shop or go all the way in providing adequate tools to secure precision and quality.

Tools Cut to Minimum

An outstanding example of shop operation without an extensive outlay of tools is the Robinson Run No. 2 mine. It is a new operation, full-mechanical, producing 5,500 tons per day. The shop has only a few motor-driven tools and does not include a lathe. The shop building, however, in which the inspections and replacements are handled, is strictly up to the minute in spaciousness and arrangement. In contrast to that Robinson Run shop without a lathe, the Independent Coal & Coke Co., Kenilworth, Utah, tells of "several additions to the machinery in our shops." Also, the Utah Fuel Co., Castle Gate, installed a number of machine tools, along with an additional welding set, in a complete modernization of shop facilities.

Reports and field investigation indicate that arc-weld filling of locomotive tires increased during 1939. However, one company, which operates over a dozen large mines and which filled tires by hand methods, practically discontinued tire welding in favor of buying new tires. The reason given was a reduction in price of tires and the opinion was expressed that this reduction in price probably was brought about by the fact that arc-welding was reducing the tire-sales volume.

An over-all cost of $11 per tire for double-head automatic filling at Mine No. 43, Peabody Coal Co., Illinois, was given in the December, 1939, *General Electric Review*. It is stated that out of 1,376 tires welded, only 11 broke and, "since the development of improved welding practices, there has been no breakage whatever." The procedure is to preheat the tires, peen the new bead continuously by motor-driven hammer and cool the wheels slowly in an insulated case.

Fiber-glass coil insulation for underground and other mining machinery subjected to heavy loads or heat and, in some cases, moisture, is making progress. Opportunities for improvement in glass insulation lie principally in raising the heat-resisting characteristics of the varnishes or other organic materials with which the glass fibers must be impregnated. Numerous companies are conducting operating tests on a few armatures with glass insulation. In northern West Virginia, for example, Maiden mine, Kelleys Creek Colliery Co., is trying glass in armatures of CY-21 reel motors and Pursglove has standardized on glass coils for rewinding 35B and 35BB mining-machine armatures.

Glass Proves Advantages

Reports from one large coal company on a 100-per-cent glass-insulation basis indicate, in its opinion, that fiber glass is an unusually good material for mine use, as it is not affected by moisture. This company probably has 300 locomotive fields insulated with glass in service since work was begun three years ago. Even today, only an occasional glass field appears for repairs. A recent check of fields in the shop showed one glass and 65 cotton- and asbestos-insulated units. The same results have been experienced in a lesser degree in armature and motor insulation. More than a 50-per-cent increase in the life of armatures in service was noted in 1939, all classes included. Possibly some of this increase may be due to better maintenance, but much "certainly" was due to glass insulation, despite the fact that not more than 30 per cent of the armatures are so equipped. However, these have gone into the toughest jobs on hand, these jobs being the ones that originally resulted in the big turnover. So the increase in life thus is not unreasonable.

"The fact that glass insulation does not have the abrasion-resisting properties of cotton or asbestos appears not to be important. Field and armature coils which have been received to date show no indication of abrasive failures. The added life being received from field and armature coils insulated with glass appears to be the result principally of their ability to withstand moisture and heat." Incidentally, a number of field coils were installed two or three years ago with nothing but glass insulation; i.e., the coils were taped with glass tape dipped in varnish and placed in service. So far, none has been returned for repairs. "If repair work of this kind can be done it will considerably reduce the cost of repairing field coils." No unusual conditions have arisen in the application of glass insulation and "it does not appear that any more time is required to insulate equipment with glass."

Asbestos Leads Favored

Asbestos-insulated cables for connections and leads on mining machines, loaders and locomotives found wider favor. Once a mining official or maintenance man tries this type of cable, and is convinced of the extra service under hot and perhaps oily conditions, he seldom shies at the extra cost. The increasing importance of reducing machine delays and the higher cost of labor for making repairs appear to have driven home the fact that the best in maintenance materials is none too good, and that the first cost seldom is a factor.

Progress of the past year in mine lighting was confined almost entirely to the more general use of cap lamps and yet the desire for better light was responsible only in part. Relieving machine operators of the delays necessary in servicing flame lamps was the other factor. Typical of the new installations over the country are these: Page Coal & Coke Co., "cap lamps added to increase efficiency of men and help load clean coal"; Alabama By-Products Corporation, "cap lamps installed at Colta mine, completing the installation of electric cap lamps at all our mines."

SAFETY GAINED IN 1939

So Coal-Mine Safety Leaders Discuss How to Better Figures Hung Up for Last Year

Statistical records establish necessary bench marks for measuring progress. Analytically interpreted, as Mr. Adams has done in opening this safety symposium, they also chart the path for future gains. But how the industry itself views the situation so analyzed and what it plans are vital if progress is to be made. This viewpoint, as expressed by spokesmen for the major groups most directly concerned with accident-prevention work, is set forth in the sections following Mr. Adams' presentation.

What the Statistics Show

By W. W. ADAMS

Supervising Statistician
Employment Statistics Section
U. S. Bureau of Mines

INFORMATION available at the close of 1939 indicated that the year's accident-prevention record was better than in 1938. The improvement consisted in holding down fatalities to almost the same number as in the preceding year despite greater production and a larger volume of employment. Output increased approximately 12 per cent and man-hours worked rose in about the same proportion. The number of fatalities is estimated at 1,106, compared with 1,103 in 1938.

This figure is based upon reports from State mine inspectors showing 931 fatalities in the first eleven months of 1939, supplemented by an estimate for December and for probable revisions in the 11-month figure to cover deaths from injuries which had not proved fatal when the preliminary reports were made. Fatalities by months and by causes, according to preliminary information, are given in Tables I and II. Non-fatal injuries—estimated at 57,000—increased between 5 and 6 per cent compared with 1938, but were approximately 45 per cent below the 103,821 injuries in 1930, the earliest year for which such data are available.

That the industry has made progress in accident-prevention may be seen by comparing the record during the most recent years with that in the earliest years for which such figures covering all coal-producing States have been collected. Such comparisons covering average rates on fatal accidents for the three 3-year periods 1910–12, 1930–32 and 1937–39 are given in Table III.

Compared with 1910–12, the 1937–39 record shows a 54-per-cent reduction in the number of deaths. While this reduction was being made, the number of man-hours worked declined only 49 per cent and output dropped only 13 per cent. In other words, fatal accidents decreased faster than either production or man-hours of exposure. Compared with 1930–32—the earliest years covered by available records for both fatal and non-fatal injuries—1937–39 showed a decline of less than 1 per cent in production and of only 11 per cent in man-hours, as against a decline of 23 per cent in fatalities and 26 per cent in non-fatal injuries.

These facts make a creditable showing for the industry because they indicate sharp reductions in the actual number of fatalities with relatively mild reductions in yearly coal output.

Table I—Monthly Fatalities in 1939

	Bituminous Mines	Pennsylvania Anthracite Mines	Total
January	65	29	94
February	68	17	85
March	74	13	87
April	24	23	47
May	37	19	56
June	63	8	71
July	81	18	99
August	75	17	92
September	105	15	120
October	109	27	136
November	99	12	111
December	90	18	108
Total	890	216	1,106

Table II—Causes of Fatal Accidents in 1939

	Bituminous Mines	Pennsylvania Anthracite Mines	Total
Underground			
Falls of roof and coal	525	129	654
Haulage	161	30	191
Explosions—gas and dust:			
Local	17	3	20
Major	28	..	28
Explosives	12	15	27
Electricity	52	2	54
Machinery	28	..	28
Shaft and miscellaneous	26	17	43
Total underground	849	196	1,045
Surface and open-pit	41	20	61
Grand total	890	216	1,106

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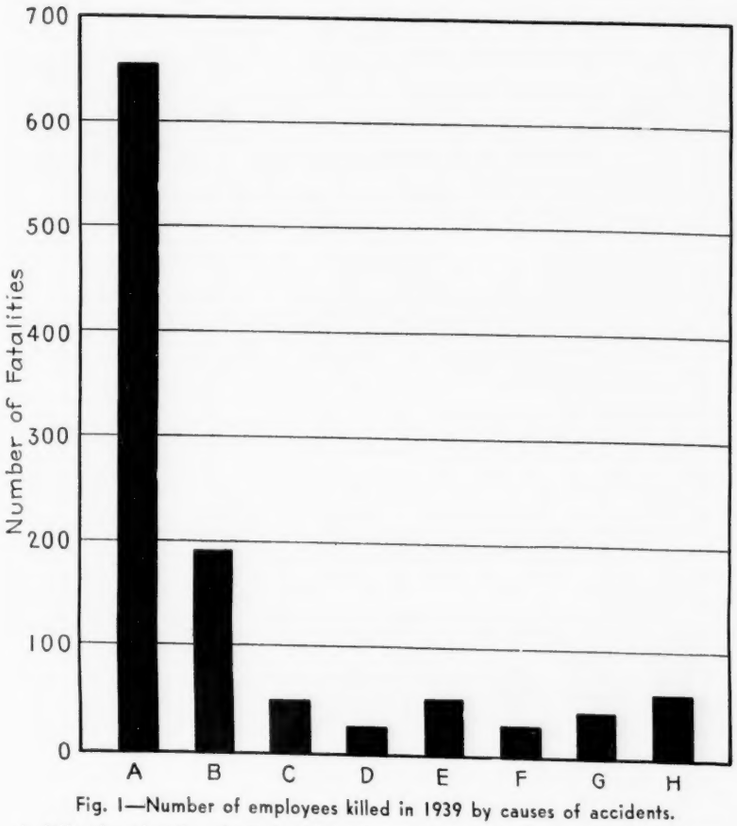


Fig. 1—Number of employees killed in 1939 by causes of accidents.

A, falls of roof and coal; B, haulage; C, explosions, gas and dust; D, explosives; E, electricity; F, machinery; G, miscellaneous; H, surface and open cut

All classes of accidents have been reduced in number since 1910–12. Production needs have been met with a smaller working force because productivity per man-hour has been increased by improved equipment and working methods. Productivity per man-hour rose from 0.36 ton in 1910–12 to 0.55 ton in 1930–32 and to 0.61 ton in 1937–39.

Increased production per man-hour, it should be remembered, has reduced the number of men employed, but the reduction in accidents has only slightly exceeded the reduction in employment. The per-million-hour fatality rate has been lowered from 1.87 in 1910–12 to 1.67 in 1937–39. This indicates better conditions for the average miner in 1937–39 than in the earlier period. Virtually all the improvement represented by the reduction in the fatality rate per million man-hours of exposure, however, has been made through the prevention of accidents due to gas and dust explosions, explosives and hazards incident to work above ground.

Much remains to be done before equal progress is made in lowering accident rates for falls of roof and coal and for mine cars and locomotives—two types of accidents which directly affect the largest classes of

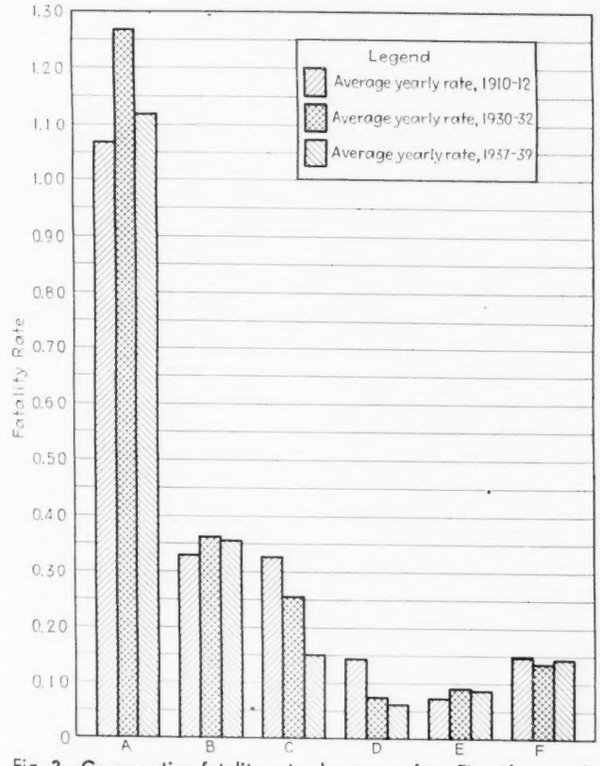


Fig. 2—Comparative fatality rates by causes (see Fig. 1) per million man-hours worked underground (1938 and 1939 estimated).

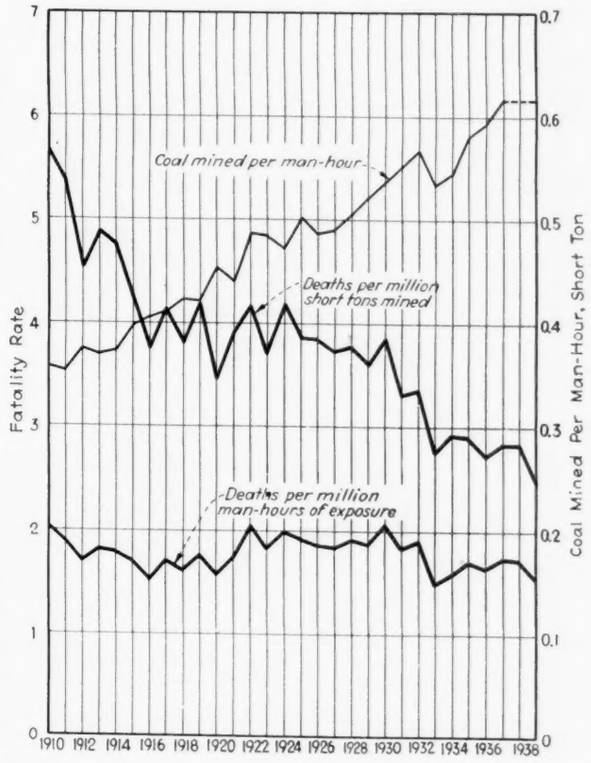


Fig. 3—Yearly fatality record for United States coal mines (coal mined per man-hour in 1938 and 1939 estimated).

Table III—Average Number of Fatalities Per Year, and Fatality Rates Per Million Man-Hours Worked, 1910-12, 1930-32, 1937-1939

	1910-12		1930-32			1937-39		
	Number of Fatalities Per Year	Fatality Rate	Number of Fatalities Per Year	Per Cent Change From 1910-12	Fatality Rate	Number of Fatalities Per Year	Per Cent Change From 1910-12	Fatality Rate
Underground								
Falls of roof and coal	1,253.0	1.072	861.3	−31	1.266	660.0	−47	1.115
Haulage	385.0	.329	247.0	−36	.363	210.3	−45	.355
Gas and dust explosions:								
Local	51.0	.043	35.3	−31	.052	22.3	−56	.038
Major	333.0	.285	138.3	−58	.203	67.0	−80	.113
Explosives	167.3	.143	51.3	−69	.075	35.3	−79	.060
Electricity	84.3	.072	61.0	−28	.090	50.0	−41	.084
Other (including shaft)	174.0	.149	91.7	−47	.135	84.3	−52	.142
Total underground	2,447.0	2.093	1,486.0	−39	2.185	1,129.3	−54	1.908
Aboveground (including open-pit mines)								
All causes	184.3	.766	91.7	−50	.682	78.0	−58	.604
Grand total	2,632.0	1.867	1,577.7	−40	1.937	1,207.3	−54	1.674
Production (millions of short tons)	510.8	.....	446.1	−13	.....	443.3	−13	.....
Man-hours, total (millions)	1,409.9	.....	814.5	−42	.....	721.1	−49	.....
Man-hours, underground (millions)	1,169.2	.....	680.2	−42	.....	592.0	−49	.....
Man-hours, surface and open-pit (millions)	240.7	.....	134.3	−43	.....	129.1	−46	.....

	1937	*1938*	*1939*
Number of fatalities	1,413.	1,103.	• 1,106.
Production (millions of short tons)	498.8	• 391.5	• 439.7
Man-hours (millions)	811.4	• 637.7	• 714.3

• Preliminary.

employees underground. While the actual number of lives lost from these causes has been greatly reduced, the number of deaths in relation to the number of men employed continues high. Although the smaller number of fatalities is significant and important from an economic or national viewpoint, the relative number of deaths in proportion to the number of employees exposed to risk is the fact most vital to the underground workers.

Whatever the social gain represented by reduced fatality rates per million tons mined, only to the extent that the miners themselves become a more acceptable life-insurance risk can their position be said to be improved. It is imperative, therefore, that the miners, as well as their supervisors and the mine owners, be reached by safety workers conducting accident-prevention campaigns.

Anthracite Executive Viewpoint

By CADWALLADER EVANS, Jr.

Vice President and General Manager
Hudson Coal Co.

WE BELIEVE that safety work is of tremendous importance not only to the company but to the individuals who undertake safety training for their own benefit. The direct benefit to the employer is obvious because a workman who avoids injury avoids liability to the employer for cost of compensation. Measured in dollars and cents, the direct benefit to the family of the individual is of even greater importance because generally that individual is the sole support of his family and, if he is injured, the family budget must be reduced, since compensation payments are necessarily less than full earnings.

We believe that a well-conceived and carefully carried out safety program has such wide benefits to the company concerned, to the individuals concerned and to the community in which these individuals live that it should have the continuous and enthusiastic support of everyone.

Our experience shows that the men who are willing to devote their own time to training themselves in first-aid and rescue work are generally the leaders in every other worth-while project that comes to their attention. Many of these projects concern the business of the company by which that individual is employed, and his interest in these projects consequently helps the company as well as himself. Many of the projects concern the commmunities in which these individuals live. Our experience shows that their interest in first-aid work is of direct benefit to their communities because it quickens their tendency to think of others and to try to help others.

We are firmly convinced, therefore, that safety work not only stimulates correct thinking in the prevention of injuries but in many other lines and, as a result, has a beneficial influence on the welfare of the communities in which it is in active operation. So we say to our men that training in first-aid and attention to our program of injury prevention is a good thing for them, a better thing for their families, and the best help they can give to their fellow workmen and to the community in which they live and work.

Bituminous Executive Viewpoint

By EUGENE McAULIFFE

President, Union Pacific Coal Co.

AS THE executive head of the largest coal-mining company west of the Mississippi River, producing 3,261,003 tons last year, I have no hesitancy in saying that there are certain essential requirements necessary to keep the accident roll down to the minimum figure. These requirements are:

1. The necessary expenditure of money to insure safe working conditions. These include ample and continuous ventilation; the prevention of coal-dust accumulations of combustible character, which can be secured through the use of water on mining-machine cutter bars and elsewhere and by rock-dusting; adequate and well-planned timbering, and clearance along haulageways. Proper electric installations and maintenance also are essential.

2. Leadership—not alone on the

part of the often overworked mine foreman but by the president, vice-president, general manager and the other ranking officials who represent, in the minds of the employees, the coal company. The term leader means "to guide, as with the hand," "go before in order to guide," "be first or chief among." We have too many so-called leaders in industry who are inclined to shift their employee safety responsibilities to the shoulders of their subordinates.

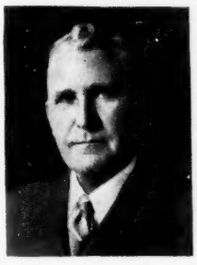
3. Last, and by far the most important requirement, is that of securing the hearty cooperation of the mine workers, who take the punishment. This relation exceeds every other factor in importance and can be attained only by selling the theory of unqualified fair treatment and competent leadership to the men and their dependent families.

I speak advisedly on the subject of employer and employee relations. More than in any other way such relations have made it possible on our properties to progressively raise the record of exposure per lost-time accident—fatal and non-fatal—from the ten-year average for 1923–1932 of 15,931 man-hours to 61,165 man-hours in the next five years, to 103,172 man-hours in 1938 and to the high point of 124,369 man-hours per lost-time accident in 1939.

What the State Can Do

By JAMES McSHERRY

Director, Department of Mines and Minerals
State of Illinois



MANY of the activities of a State department charged with the administration of mining laws have a reduction in accidents as their primary objective. We must have laws to govern the industry, but statutory regulation and the best possible administration will not in and of themselves make mines the safe places we want them to be. Law-making bodies cannot always bring about statutory enactments with sufficient speed to meet changing conditions. A law which adequately regulates today's conditions may be practically useless tomorrow. And no law, regardless of how good it is, will prove successful unless those governed by it are in sympathy with it.

The State mining department, therefore, must educate both men and management to cooperate with it to the fullest extent. Indeed, the measure of any such department's success in administering laws will be the extent to which this cooperation is secured.

Obviously the partnership that will get the best results will be the three-cornered combination of men, management and mining department. This is certainly one combination from which everybody can profit. Men and management may have their differences over one thing or another, the State mining department's ideas in all cases may not be the same as those of the company or the men; but safety is one thing on which it should always be possible to find some common ground of understanding between all three.

How can a mining department contribute to this partnership? Well, safety can be taught, and any man capable of working in or around a mine can learn his safety lessons. If at first a man doesn't like the idea of carrying a rod to sound the roof at stated intervals, he can be shown how reasonable that regulation is for him and how much better off he will be if he observes the regulations—and this necessary change in mental attitude can be won without hurting anybody's feelings.

At the other corner of the triangle, the State mining department can help sell management on the idea of making necessary or desirable—even though sometimes costly—changes in its operation. To the fullest extent of its ability the mining department also should make first-aid training and general safety instruction available to the industry. A State mining department can be very helpful to safety by studying the causes of accidents and recommending measures for their prevention. Obviously no code of laws that could be compiled could contain a sufficient number of "do's" and "don't's" to cover every situation, and consequently special rules frequently must be made.

I am a strong believer in first-aid training as an adjunct to any safety campaign. Men so trained gain an added safety consciousness which, almost without their knowledge, helps them to avoid accidents. First-aid and all other classes of safety instruction should be attended by management. Remember, management is to share in this safety jackpot, so the slogan should be: "Bosses, don't miss any classes!" What will the mining department's share be? Well, if nothing else, the satisfaction of seeing accident records improve.

The Safety Engineer's Role

By C. G. BREHM

Supervisor of Safety and Compensation
Susquehanna Collieries Co.

A STRIKING illustration of the importance of safety in the minds of those having service to sell is found in the advertisements of the transportation companies operating facilities from airplanes to buses. Along with the speed and economy of their particular service, safety is stressed, and so from the mines and factories recognition of the importance of safety has extended to all business.

The safety engineer thinks first of safety as a humanitarian duty—the saving of life and limb; the prevention of suffering and grief. But to accomplish such desired results he must encourage and build a program that incidentally will show the executive that, aside from sympathy for the afflicted and the effect of safety on public opinion, such a program is economically sound. In mining, operating heads and mine foremen must be impressed not only with the humanitarian obligation but with the effect of accidents on production cost. And the workman must be sold the fact that eternal vigilance is the price of

safety and that he is the one most affected if an accident occurs.

Successful operation of such a program depends largely upon the cooperation of all concerned from the chief executive down to the workman at the face, and results may be proportional to the extent of such cooperation.

It is said that the three fundamentals of safety are education, supervision and discipline. Education must be more than the issuing of orders: the workman should be told not only "how" and "why" but, when necessary, should be shown. Supervision should be as extensive as may be practicable, and discipline, while firm, must be just, reasonable and fair. Safety rules must be practical and should be as simple as possible. They should, of course, be observed equally by officials and workmen.

Such, briefly, spells safety. Its importance is admitted and recognized, but we must do more than simply desire safety. We must be willing to contribute our unselfish part to the program, which, if energetically pursued, should result in the maintenance of production, in the reduction of accidents and the lowering of costs.

How the Manufacturer Helps

By JOHN T. RYAN, JR.
Vice-President
Mine Safety Appliances Co.

PROGRESS of safety in coal mining is of particular importance to the manufacturer of safety equipment as he is one of the many groups aiding in the promotion of greater safety underground. The safety record of the industry, its success and its failures, are both an inspiration and a challenge to his efforts in developing equipment which will serve to better these records.

Safety equipment in itself prevents accidents by detecting hazards, reducing their severity and preventing injury through protection afforded the miner and aiding in recovery when injuries are suffered. Overlooked at times is the indirect value of such equipment as a constant reminder of safety to the user. Just consider how often a miner wearing a protective cap thinks of safety when his cap saves him from an injurious blow.

First-aid training has been found by many mine managements to have been of assistance in their general safety program through the contact provided by 100-per-cent first-aid training with all of their men and through first-aid meets with their families. Such training brings recognition of the serious injuries which may result from lapses in vigilance.

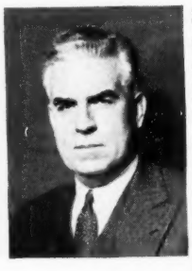
Close attention is given by the safety-equipment manufacturer not only to progress particularly relating to safety but also to new methods of mining, new machinery and new operating ideas. This is essential if safety equipment is to keep pace with new developments. Almost every change in mining involves safety. New safety methods as well as new equipment must be devised to meet the changing conditions in the industry.

With the more general use of conveyors and shuttle cars, means had to be worked out for rock-dusting sections using this equipment. This resulted in the design of two new types of rock-dusting machines to meet these special conditions. As the use of mechanized equipment underground progressed, the need for more effective and better directed illumination brought forth new models of electric cap lamps. The importance of ventilation control and periodic measurement of methane in various splits led to the development of light, easily operated methane testers.

In the development of such equipment well-organized research is necessary. This means chemists, physicists and engineers, aided by men in the field having close contact with mining and its problems to guide this research and assist in field tests. Such research work is many-fold but it involves principally meeting the new safety problems of the industry with new equipment or adaptation of existing devices and, on the other hand, the utilization of the findings of science in other fields to the problem of coal-mine safety. Thus the research laboratory of the safety-equipment manufacturer stands at the crossroads between the safety problems of the industry and the possible solutions offered by science and engineering knowledge. To keep close to a progressive industry the safety-equipment manufacturer watches closely the safety progress made in coal mining.

Management's Obligation

By L. C. CAMPBELL
Assistant to the Vice-President, The Koppers Coal Co.



SAFETY in coal mining can be accomplished only by definite executive responsibility augmented by an adequate organization for training in accident prevention and enforcement of the program. It is the obligation of management to throw around its operations those safeguards which are necessary to eliminate unsafe conditions and unsafe practices in and around the mines.

Trained safety engineers, who have become an important part of nearly all industrial operations, are best qualified to carry through the day-to-day education of workmen and correction of hazardous conditions and hazardous practices. There are many such men in all types of industry who are doing a fine job in accident prevention. We need more of them in coal mining.

Nothing, however, can take the place of personal carefulness by the workman. His full understanding and cooperation will go a long way toward making any accident-prevention program a success. A full realization of the fact that his personal well-being and the well-being of his family are closely identified with safety work will make him a safe, careful worker in any industry now known.

As the Foreman Sees Safety

By THOMAS JAMES

Mine Manager
Knox Consolidated Coal Corporation

A MINE FOREMAN'S success is governed to a great extent by the confidence in his ability as a leader he can instill in the men working for and with him. If his safety record is smirched, by just so much is his prestige damaged. It has been proved conclusively that safety and efficiency go hand in hand; in other words, a safe mine is an efficient mine, and to exist under present economic conditions a coal mine has to make grade A.

A foreman knows, or should know, that the cost of compensation per ton is greater than the cost of any other single item that comes under his jurisdiction. If all labor costs and compensation are added together and the combined total is called the 100 per cent cost, compensation cost will be around 25 per cent of this total.

There is no single item of mine cost which can be so readily reduced or over so wide a range as the compensation cost. A low compensation cost is the reward for good management. In fact, in many instances if the cost of compensation could have been cut in half, it would have meant the difference between survival and the collapse of the company involved. Moreover, this saving also is augmented by the increased efficiency which is gained by working safely.

Different men will have different methods for securing the desired results. But whatever the method used, we must get the cooperation of the employees. The superintendent must be 100 per cent sold on safety; the general manager and the president, if for no other reason than the financial one, also should be 100 per cent for safety. If the mine foreman is worthy of that title, he, too, for his own success, will have to be 100 per cent sold on safety. So, apart from all humanitarian motives and judged solely by the selfish motives which so largely govern our actions, it is common sense to try for 100 per cent safety.

PROMOTIONAL CAMPAIGNS

To Keep Coal Ahead in Fuel Battle

Increased in Intensity and Scope in 1939

PROMOTIONAL activities to hold the front-line trenches for coal in the battle of fuels increased both in intensity and scope last year. Coal's allies were swelled by the enlistment of a leading Southwestern public utility. Results of the joint campaign waged in that area by coal men, stoker interests and this utility have been so successful that similar alliances in other sections are forecast. Coal also received signal recognition when the Direct Mail Advertisers' Association awarded Cabin Creek Consolidated Sales Co. a cup for the best sales letter and campaign of 1939.

As for some time past, the spearhead of hard coal's promotional attack upon its competitive situation was Anthracite Industries, Inc. Despite the withdrawal of some financial support at the end of the original three-year program, the organization kept up its merchandising efforts. Its work was highly indorsed by retailers, who joined with many producers in insisting that there be no curtailment of Anthracite Industries' activities this year.

Early in 1939, the Bituminous Coal Utilization Committee, representing Kansas, Missouri and Oklahoma producers, enlisted the cooperation of stoker men, retailers and the Kansas City Power & Light Co. in a joint campaign. The utility made installation of stokers easy by offering to finance purchases for an initial deposit of $5 and the balance on small monthly payments. Operators pledged $15,000 for advertising and other promotional expenses, including subsidies to builders to cover 10 per cent of the difference in the cost of coal-heating and gas-fired installations in new homes.

Advertising—confined to the Kansas City *Star*—started late in February (*Coal Age*, March, 1939, p. 66). Committee copy was supplemented by advertisements of the allied interests in the same issues. Up to Nov. 1, over $542,550 had been chalked up in new stoker sales to home owners, apartments, industries and builders.

During those eight months, stoker companies reported sales of 1,241 units under 50 lb. hourly capacity and 282 larger capacity units in Kansas City and the territory within a 200-mile radius. These totals were exclusive of sales from several smaller outlets from which no reports were re-

Kansas City public utility uses billboards to promote coal stokers.

ceived. In that eight-month period, one new stoker was installed for every two that had been put in during the preceding decade. The number of active stoker dealers in the territory rose from 20 to 61.

Fourteen of the first 100 stokers sold through the Kansas City Power & Light Co. were installed in new homes, 26 replaced gas or oil and 56 meant a shift from smokeless to high-volatile coal. The 56 who shifted, according to the committee, wanted automatic heat and, without the stoker campaign, might have turned to oil or gas. On the basis of these figures, the committee estimates that the total sales represented a 96-per-cent gain for high-volatile coal. If, as the committee points out, each stoker averages 10 tons per year, 15,000 tons of new business has been added to the books of producers and retailers in that area.

With committee approval for continuing the program in 1940, the utility also is carrying on. As part of its contribution to the campaign, the utility has set a sales quota of 600 domestic stokers for this year. It also is establishing an industrial and commercial stoker department to go after larger sized installations. Late in 1939, Utah coal producers also launched a campaign to promote stoker sales. Advertising features the slogan "as little as $6.50 monthly buys an automatic coal stoker." Sales have increased sharply since the campaign, using three newspapers and two broadcasting stations, started.

The campaign which won Cabin Creek national recognition (*Coal Age*, November, 1939, p. 80) was built around an essay contest open to high-school seniors in six States. Dealers were asked to furnish the names of high-school principals in their communities. A well-executed 32-page booklet entitled "Taking King Coal to Market" was sent to each principal with the following letter signed by the president of the company:

> May we direct your attention to the booklet inclosed?
>
> We think it tells a story which is worthy of attention from the standpoint of practical education. For several years we have had requests for our advertising and merchandising material from school men who have been close to us in our community . . . and the inclosed booklet is our attempt to bridge the gap between theory and practice.
>
> You know . . . and we know . . . that in many cases high-school graduates are not privileged to continue their education. Perhaps practical information, such as is contained in this booklet, will help them to find their place in the work-a-day world of tomorrow.
>
> We invite your careful reading of the booklet, "Taking King Coal to Market." If, after reading it, you believe it may have some value, we would be pleased to supply you with additional copies to take care of your classes in commerce, general science and English.
>
> We are sponsoring an essay contest over six States—with this booklet as a base—open to all senior students in any high school on the subject "Importance of Solid Fuel in the Development of American Commerce." Our company will award three prizes of properly chaperoned tours to the 1939 World's Fair in New York City.
>
> We have also prepared a two-reel 16-mm. motion picture on this same subject—"Taking King Coal to Market"—which we will be glad to furnish you at any time you may find convenient.

A second direct-mail campaign was directed to the consumer. It consisted of eight mailing pieces, sent out monthly from August, 1938, to March, 1939. This series had "fire is man's warmest friend" for its theme. The history of fire was traced from discovery through smoke signals, fire worship, the wedding of coal and water to make steam to the invention of the Franklin stove. Each folder was colorfully illustrated and went out to the consumer over the name of his local dealer.

These folders cost about 4½¢ apiece in the mail, with the dealer contributing 2¢. Each mailing approximated 200,000 pieces. The booklets cost 16¢ each for a run of 80,000. Results in the essay-contest campaign, directed by Harry V. Miles, advertising manager, showed 650 schools participating and 32,500 essays submitted. The motion picture, exhibited 338 times, was seen by 62,918 people. In addition, Cabin Creek added 245 new exclusive accounts for its Blue Beacon coal.

General bituminous promotion work in 1939 emphasized two major themes: (1) How coal fits into the national employment, wage and tax pictures and how these are affected by unfair and subsidized competition; (2) direct promotion of coal heat, particularly with automatic firing equipment. While the National Coal Association took the leadership in the campaigns, strong assistance was received from mine and railroad labor, individual producers and associations, wholesale and retail groups, manufacturers of heating equipment, coal-carrying railroads and organizations such as the Illinois Reciprocal Trade Association.

Many Join in Program

Sparking the campaign, National Coal issued a complete series of messages for distribution by members and allied interests. Efforts of many independent and local organizations—such as the Wyoming "Burn More Coal and Ship by Rail Committee," New Mexico miners and operators, and Alabama Coals, Inc.—were keyed into the N.C.A. programs. The Baltimore & Ohio and Alton railroads inaugurated an essay contest—one of several by various organizations—on "Why I Favor an Automatic Coal Stoker for Home Heating."

Considerable success also was registered by mass meetings of operators, miners and the general public to discuss common problems; such meetings, for example, were held at Earlington, Ky.; Nashville, Tenn., and Bluefield, W. Va. Speakers from National Coal and other associations and from individual coal companies were kept busy telling coal's story where it would do the most good. Special representatives offered assistance in solving fuel problems; a spokesman of N.C.A., for example, appeared

before the Buffalo (N. Y.) City Council and was able to hold a proposed $2,000,000 public auditorium in the coal-burning ranks.

Direct promotion of coal heat by N.C.A. headed up in an advertising campaign addressed to solid-fuel merchants, architects, builders, real-estate managers and home owners. This was supplemented by informative booklets and pamphlets, such as the 1939 Basement Plan Book for architects, builders and home owners. Automatic heat also was the primary theme in advertising by a number of local groups.

Participation in better-homes exhibits, model houses, State and local fairs experienced a substantial growth last year. An outstanding example of this trend was the "Pot-of-Gold" model home opened in Chicago on Dec. 2. Through the efforts of the builder, the Committee of Ten and the Midwest Stoker Association, this dwelling was equipped with a bin-feed stoker in a modern warm-air furnace with winter air-conditioning. Both the stoker group and the Chicago Coal Merchants' Association promoted the opening with sizable advertising campaigns to get residents to visit the home. A similar home in Indianapolis was opened to inspection before completion so that the public might see how it was built. Public response in both cases was enthusiastic.

NEW RESEARCH INSTITUTIONS

With Much Activity in Former Centers Give Promise for the Industry of Tomorrow

FURTHER State and Federal participation in coal research is being sought by those sections of the public that have specific problems in dire need of solution. Even though the U. S. Bureau of Mines as a whole has been fated to receive painfully inadequate financial assistance, local pressure still may be able, by loud protestations, to obtain funds for a study of some particular local coal problem or problems. Congress always seems willing to enter into entirely new commitments and sparing in continuing and maintaining old ones. Such an instance of local pressure was the demand, at an earlier date, of the Rocky Mountain area for research into the carbonization of lignite. Specific agitating groups are the smoke-beridden cities of Salt Lake City and St. Louis and the harried coal industries of the anthracite region and Ohio.

Many research projects were prosecuted during 1939 and most of them will continue into 1940. Those reported in the tabulation represent, in the main, research projects conducted by professional scientists giving full time to the purposes enumerated or

Nylon stockings and gloves, garments coated with Koroseal, and Lucite, that carries light around a corner, are all three recent comers in industry and are derived from coal. The first two seem likely to use sizable quantities of the fuel. What is impressive is that they are not substitutes but better products in ways than those they may displace. They do not break readily because they are plastic, not brittle, and they are insulating, which, with the universality of electricity, is a comforting assurance

college professors and their associates who combine research with classroom duties. But there are a host of manufacturers making tests at their factories and in the field, often spending more money than institutes, universities and colleges, and there are coal companies which use the services of their staff, employees and manufacturers' representatives in testing, perfecting and adapting equipment to their needs. Just where to draw the line between research and the studies made by commercial enterprises and mine operators is not easy to determine.

A bill, introduced by Representative I. D. Fenton called for an experiment station in the anthracite region to be directed by the Department of the Interior. Representative J. H. Flannery outlined a program of anthracite research to be undertaken by the U. S. Bureau of Mines. Neither bill was reported by the House Committee on Mines and Mining.

An effort was made by Representative J. E. Van Zandt in a bill he introduced May 25, at Washington, to get a Federal appropriation of $150,000 for the fiscal year 1941, $50,000 for 1942, and $100,000 for the next three years to be expended in research in coal at the School of Mineral Industries, Pennsylvania State College, with the object of increasing the use of anthracite and bituminous coal. An equal appropri-

ation was to be made by the State.

Later, Senator R. M. Miller presented a bill to provide $1,000,000 to set up an anthracite research laboratory in the anthracite region under the State Department of Mines. A revised bill called for both anthracite and bituminous research in the School of Mineral Industries and Experiment Station in cooperation with the State Department of Mines. A second Miller appropriation bill provided $50,000 for this work during the biennium contingent upon the State money being matched by industry, dollar for dollar. Both amended bills passed Senate and House but the Governor cut the appropriation to $35,000 for the biennium.

A program for this college involving $70,000 therefore actually has been inaugurated beginning in September last. Researches cover gasification of anthracite, activation of carbon, automatic comfort heating, and the oxidation and solution of coal.

Early last year, the Illinois Geological Survey looked forward to a $300,000 appropriation to finance a two-year research program, including an item of $95,000 for the construction of a research laboratory to be built at the University of Illinois, but, in signing the bill, July 5, Governor Henry Horner slashed the appropriation $120,000. Work on the design for the laboratory started at once. Smokeless briquets made by impact without binder is the study to be financed by this legislation.

Ohio Seeks Appropriation

Ohio sought from the Federal Government $200,000 initially and $60,000 a year for maintenance and operation of a research laboratory in the bituminous regions of Ohio to be devoted to studies of the mining, preparation and utilization of coal with specific reference to efficiency, new uses and market extension. The State Conservation and Research Foundation in Utah on Jan. 2 sought an appropriation of $75,000 to extend its inquiries into low-temperature carbonization, but the bill which proposed it failed of passage in the House by a small margin. An extensive report is being made of the results attained by a study financed with an earlier appropriation of $25,000.

A new Mineral Industries Building was started by the Public Works Administration during 1939 at the Virginia Polytechnic Institute, Blacksburg, Va., to house departments of mining, geology and metallurgy.

This building, which was completely inclosed Jan. 20 of this year and was to be completed Jan. 31, is of native limestone and interior walls of cinder block with spray-tinted finish and floor of mastic tile. The head house, three stories high, is 139 ft. across the front and 47 ft. deep. In the rear is an L-shaped single-story laboratory wing to house the laboratories for mining engineering, geology and metallurgy. This wing is 63x85 ft. on one leg of the L and 63 ft. wide and 152 ft. long on the other leg, giving a laboratory floor space of 15,000 sq.ft.

Battelle Gets Building

During the year, the Battelle Memorial Institute added about 50,000 sq.ft. of space as a wing from the end of the main building for chemical and metallurgical laboratories, photographic and metallographic departments, physical laboratories and a large industrial laboratory. At the close of the year, this building was almost ready for occupancy.

It is expected that, during the coming year, a Mineral Industries Building will be erected at West Virginia University, in Morgantown, at a cost of $770,000, to be devoted largely to research in coal and other mineral products of the State as the basis for education of State citizens of all ages. A grant of $30,000 has been provided by the Works Progress Administration for investigation of the smoke nuisance in St. Louis, Mo.

Bituminous Coal Research did no work in 1939 but is arranging for additional financing from the coal industry and may be able to resume the sponsorship of projects in the present year. A program of work has been outlined and $40,000 per year has already been assured for a period of three years.

During 1939, plasticized special vinyl chlorides, $CH_2 = CHCl$, the basic ingredients of which are coke, limestone and salt, known as Koroseal, Korogel and Korolac and developed by the B. F. Goodrich Co., have been receiving much attention, though the plastic has been known for some years. The three materials are respectively a solid ranging from the hardness of bone to that of a soft gel, an extremely soft grade and a solution.

Koroseal can be applied to straw, paper, linen, and other fabrics, making almost all of them, it is said, sunproof, water proof, odorless and washable. The fabrics are said to be "duranized" by the application. They are passed through vats of the solution and rolled by great rubber-manufacturing machines. The application of Koroseal seems endless, running as it does from wall paper, flooring, raincoats, upholstery to acid-tank lining, cable insulation and sheathing. The place for plastics derived from coal seems broad and inviting.

Nylon, a polyamide yarn, also derived from coal, became a commercial product in the past year. On May 9, E. I. du Pont de Nemours & Co., Inc., received patents covering the use of the new yarn for stockings, reboarding stockings, setting yarns and fabrics.

Another product of coal, air and water perfected by the same firm is Lucite, a polymeric methyl methacryiate, which looks like rock crystal. When a piece of this plastic, which is shatterproof and half as heavy as glass, is made in the form of a bent rod, the light entering the rod will turn the corner with it and emerge at its end. Public knowledge of this material was slight until the past year. It is almost unbreakable.

The same company also in 1939 patented "tough water," which will form, on coal and some other materials, a film only a few molecules thick. The so-called "active agents" which create these tough films include starch acetate and tannic acid. These properties were discovered in developing this company's sink-and-float process of washing.

Off-Peak Current for Coke

Success in coking coal by electricity in a continuous retort was reported by the Tennessee Valley Authority engineers as the result of experiments extending from 1934 to 1936. Using off-peak current, it is asserted that a plant for making coke by this means could be operated at a profit. Activated carbon said to pass the specifications of the U. S. Army for gas-mask carbons has been produced from coal by the Carbide & Carbon Chemicals Corporation.

Anthracite Industries Laboratory still continues its important work of testing domestic furnaces and accessories, pointing out their defects, giving suggestions for improvement and registering its approval whenever the equipment so merits. . In the stoker field, patents were granted to the laboratory covering both electrical ignition of anthracite and a new package kindler for the same purpose. Without publicity or advertising, enough of the kindlers were sold during 1939

to light every anthracite stoker in the country.

Raw lignite, at the University of North Dakota, is being placed in an autoclave with saturated steam at a sufficiently high pressure and for a sufficient length of time to eliminate 50 to 80 per cent of the moisture in the material "as mined," permitting it to dry without the excessive slacking or disintegration which normally occurs when lignite is dried in air. No byproducts are formed in this, the Fleissner, process. The operation produces a dried lignite and a waste condensate.

Drying lignite increases its heating value per unit weight, eliminates unnecessary freight charges, and reduces weathering. Being merely a pilot plant, only about a ton of lignite is dried daily, but enough dried fuel is being prepared to establish, on a commercial scale, its resistance to handling and weathering, its burning characteristics and the cost of production.

Lignite to Sinter Hematite

Studies made at the same university have shown that with pulverized lignite low-grade hematite can be reduced to magnetite at temperatures as low as 752 deg. F. Effects of particle size of both ore and coal, the needed concentration of the latter, conversion temperatures, etc., are to be studied. A rotary kiln has been designed for this purpose.

Stone and Travers (*Chemistry and Industry*, 52, 68T, 1933) carbonized small quantities of coal under high vacuum and obtained tars of quite different nature from those usually obtained under atmospheric pressure. These slow reactions suggested the possibility of controlling conditions so as to produce a more rapidly burning char from lignite. Effects of vacuum carbonization of lignite on the reactivity and the graphitization rate of the char will be determined by the same university.

Battelle Memorial Institute, studying relation of combustion space and setting height to smoke emission when firing bituminous coal with underfeed stokers, found that only three installations smoked enough to violate municipal ordinances and that the rate of heat liberation did not seem to affect smoke emission, but that less smoke seemed to be emitted from stokers feeding more than 400 lb. of coal per hour.

Smoke formation is prevented when air is admitted at the level at which the volatile is released from the coal, but, if the coal is not distributed uniformly or the stoker shuts off, smoke will form nevertheless. More smoke was emitted in the "off" periods than in the "on" periods with 19 out of 22 units, and this condition cannot be corrected by revision of either combustion space or setting height. Type of coal, uniform coal distribution, excess air, type of load and intelligence of operative are of equal or greater import as to smoke than liberated heat and setting height, but a laboratory investigation should be made to establish more definitely the relation between smoke emission and height of setting.

In general, asserts the American Engineering Co., its tests showed that the softening characteristics of the coal should not affect materially the performance of a stoker. The softening and behavior of several widely different coals the commercial combustion characteristics of which are known were determined by heating ½-in.-diameter pellets in platinum crucibles set in tubular electric furnaces, and larger quantities were heated in closed metal pill boxes set in electric muffle furnaces. Other samples were sealed in metallic capsules perforated at intervals and the amount of extrusion determined. But the results by any of these tests did not seem to correlate stoker performance with coal softening.

A transparent material, like glass, celluloid or Bakelite, which, when stressed, refracts in only one direction when it is viewed by polarized light (light that is which vibrates in only one direction) will show color bands or fringes which indicate the magnitude, direction and distribution of the stresses to which the substance is being subjected. This furnishes a means of determining the stresses which non-transparent bodies like rocks or coal, if elastic in a similar degree, might be expected to experience.

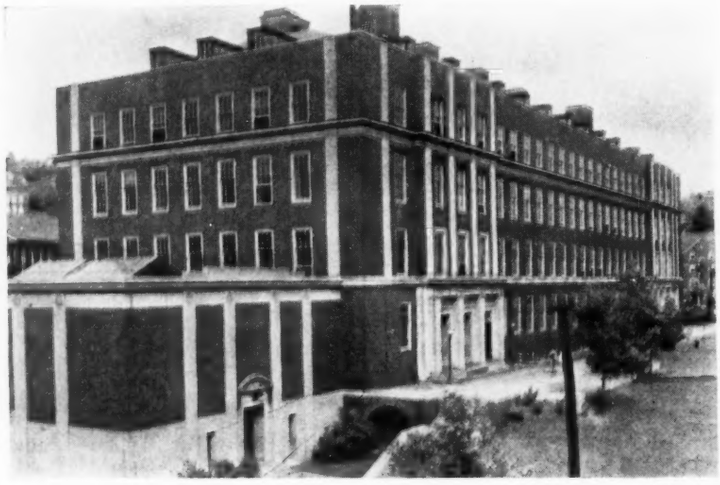
Rear of the U. S. Bureau of Mines Central Experiment Station at Pittsburgh, Pa.
Courtesy U. S. Bureau of Mines

At Columbia University, David Sinclair and P. B. Bucky have studied models of pillars to determine stresses with various shapes of pillars. They have concluded that instead of arching the side of pillars at the top into the opening it would be better to narrow them near the top. It might be objected that their determinations show rather what is best for the pillar and not necessarily what is best for the roof, and that as roof and pillar are not of a piece the condition represents what occurs after rupture at the line of contact, but the study is well worth while nevertheless.

Though previous work has shown that rate of reaction of coke and oxygen is proportional to oxygen concentration in pulverized-coal burning, it has been found at the Coal Research Laboratory of the Carnegie Institute of Technology that with 3 per cent of the catalyst, sodium carbonate, the reaction rate is proportional only at low oxygen concentrations; the reaction rate at high concentrations is

independent of the supply of oxygen. Action with different catalysts remains now to be determined.

In the burning of a particle of pulverized coal, says the same laboratory, it seems probable from the tests made that expulsion of volatile matter, its delayed ignition and the burning of the fixed carbon occur in succession with little overlapping, but the laboratory suggests that, in a pulverized-coal furnace, ignition of the volatile matter possibly may be delayed.



Chemistry Building, West Virginia University.

To ascertain the degree of oxidation of coal, hitherto, it has been the practice to find the increase in the quantity of oxygen in the entire mass before and after oxidation and not to find the degree of oxidation of the surface. This latter quantity the Coal Research Laboratory has studied by a modification of the Ubaldini-Siniramed method, which refluxes the coal in a closed system with an aqueous suspension of calcium carbonate in a solution of calcium acetate. The evolved carbon dioxide is swept out with nitrogen, absorbed and determined, gravimetrically or volumetrically.

Tar from Pittsburgh seam coal is found to contain large quantities of dihydric phenols when carbonized at temperatures from 752 to 1,112 deg. F.; that from Illinois No. 6 coal may contain also large quantities of these phenols, but only if the carbonization temperature is kept low enough. However, as temperature is increased, these dihydric phenols are not found in the tar, probably because of their instability at high temperatures (Carnegie Tech. Contribution 84).

(Dihydric phenols obtained in carbonization include resorcinol, hydroquinone, catechol and its homologues, which are phenols of much value in industry). Dihydric phenols being so instable, the Coal Research Laboratory questions the belief that polyhydric phenols are responsible for the formation of pitch.

When a charge is fired, just what is it that is emitted from a borehole that ignites firedamp: particles, the shock wave or hot gases and flames? When balloons or boxes filled with an 8-per-cent natural gas-air mixture, say S. L. Gerhard, J. C. Holtz and W. J. Huff, U. S. Bureau of Mines, were used as targets, incandescent particles passed through them without igniting the gas, showing that incendive particles are not the primary cause of firedamp ignitions. Nor does it seem that the shock wave is more than merely contributory to the ignition, for transient incandescence in nodes formed by the reflected shock wave may be observed several times before sustained ignition is recorded (R. I. 3464).

Large-scale tests of the explosibility of coal dusts have shown that a variation of the strength of the source of ignition is of major importance in determining whether a dust explosion will occur, declares H. P. Greenwald, U. S. Bureau of Mines, R. I. 3462. In mines, surface-contaminated water probably causes the presence of bacteria which convert carbon monoxide to carbon dioxide and hydrogen to water, declare G. W. Jones and G. S. Scott, of the U. S. Bureau of Mines (R. I. 3466); thus when a fire occurs these bacteria may remove the evidences of fire from the atmosphere. Fires declared suppressed because of the absence of monoxide nevertheless may be still active.

With mine waters having a total acidity up to 700 parts per million, says R. D. Leitch, U. S. Bureau of Mines (R. I. 3426), most pipes are satisfactory except plain steel, copper-steel and possibly wrought-iron pipe. For use in waters having an acidity up to about 2,000 parts per million, most pipes except those mentioned and a chromized pipe seem satisfactory, but for use in waters of unusual acidity, in excess of about 10,000 parts per million, some of the cement-lined pipes, with or without other protective coatings, pipes of impregnated fiber and coated cement asbestos pipes are most likely to prove satisfactory.

Fine Coal Needs More Flour

A study of the clarification of coal-washery water by H. F. Yancey, of the U. S. Bureau of Mines, shows that quantity of reagent necessary to produce flocculation changes with the particle size of the suspended material. Although particles from 200- to 250-mesh size require only 0.001 per cent of wheat flour, five times that quantity of reagent is necessary to give the same degree of clarification with particles passing a 325-mesh sieve.

Much research is done by operators in the mine and in the market without any definite recognition that it is being done. Whether "experience" or "research" is the word, the result is much the same. The Koppers Coal Co., however, has definitely put forward a plan for research (*Coal Age*, November 1939, p. 94) all the projects of which deal with combustion of coal and its suitability for industrial uses. Some day, every big mine will have its research engineer and every big company its research department. The Lehigh Navigation Coal Co. has had research engineers and a research department for years.

A study in the tabulation relates to an inquiry at the Mellon Institute into the means of preventing acidification of streams by pickling wastes at steel mills. As pickling liquors for steel plates consist of water, ferrous sulphate and sulphuric acid, anything that may be discovered will have direct and illuminating application to the acidification of mine water.

Coal Research in Progress or Completed in 1939 Or Planned for 1940

Air Pollution: Smoke Abatement

(See also *Safety and Health*)

Air Pollution by Smoke and Soot*, Stevens Inst. of Technology.
Dust-Separating Apparatus, Test Code, A.S.M.E. (Code published, subject to revision).
Factors That Should Govern Allowable Limits of Dust Emission From Pulverized-Coal Boiler Plants, Consolidated Edison Co. of N. Y.
Removal of Sulphur Dioxide and Flue Dust From Stack Gases*, Univ. of Ill. Utilities Research Com. of Chicago.
Scrubbers to Remove Dust, Soot, Sulphurous Gases, etc., From Gases*, Arthur D. Little, Inc., with Pease Anthony Equipment Co.
Smoke, Fly Ash and Sulphur Abatement*, U.S.B.M.
Smoke Nuisance in St. Louis*, Works Progress Adm.

Ash and Clinker

(See also *Air Pollution, Smoke Abatement, Combustion, Domestic Furnaces, Preparation, Surveys*)

Ash-Fusion Temperatures of Kansas Coals*, Dept. of Min. & Met. Eng., Univ. of Kan.
Distribution of Mineral Matter in Coal (1935)*, Carnegie Tech.
Effect of Mixing of Coals on Fusibility of Ash*, Northern States Power Co.
Removal of Ash as Molten Slag From Powdered-Coal Furnaces*, U.S.B.M.
Viscosity of Coal-Ash Slags*, U.S.B.M.

Carbonization and Distillation of Coals

(See also *Expansion and Agglutination of Coals on Heating*)

Causes and Methods for Testing Swelling Pressure Exerted by Softened Coal in Coking and Possible Damage to Oven Walls, Am. Gas Assn., with H. Porter.
Carbonization of Subbituminous Coal and Lignite*, U.S.B.M.
Coking of Coal*, Penn. State.
Effect of Conditioning Coal on Its Coking Properties*, U.S.B.M.
Factors in Coal Carbonization (1938)*, Carnegie Tech.
Gas Pressures Within the Uncarbonized Part of a Charge of Coal Undergoing Carbonization*, U.S.B.M.
Identification and Quantitative Isolation of the Components of the Phenolic Fraction of Coal Tar, Carn. Tech.
Low-Temperature Carbonization of Utah Coals†, Utah Conservation Research Fdn.
Methods of Testing for Plasticity*, Com. D-5 on Coal & Coke, A.S.T.M.
Physical and Chemical Properties of Coke Made From Washington and Other Coals†, U.S.B.M.
Plasticity and Swelling of Coal and Blends of Coal*, Com. D-5 on Coal & Coke, A.S.T.M.
Properties of Commercial Cokes (1937)*, Carnegie Tech.
Relative Fluidity or Plasticity of Bituminous Coals When Heated With Application to Behavior of Coal Mixtures in Coke Ovens, H. Porter.
Survey of Carbonizing Properties of American Coals*, U.S.B.M.
Survey of Methods for Determining Gas- and Coke-Making Properties of American Coals: Microscopic Examination of Coal*, U.S.B.M.
Swelling of Bituminous Coal*, Penn. State.
Swelling of Coal as Related to Its Combustion on Underfeed Stokers, Battelle Memorial Institute, U.S.B.M., Consolidated Edison Co., and Public Service Electric & Gas Co.

Chemical Tests of and With Coal

Including Oxidation and Solution

(See also *Nature of Coal, Preparation, Miscellaneous*)

Analyses of American Coals*, U.S.B.M.
Classification of American Coals*, U.S.B.M.
Coal Oxidation and Solution*, Penn. State.
Deoxygenation of Coal With Aqueous Alkali and Hydrogenation of Coal in Presence of Alkalies (1934)*, Carnegie Tech.
Determination of Surface Oxidation (1939)*, Carnegie Tech.
Hydrogenation Studies of Coal Constitution*, Carnegie Tech.
Investigation of Organic Chemical Constitution of Coal by Oxidation Pressure (1939)*, Ill. Geol. Surv.
Methods of Analysis of Coals*, U.S.B.M.
Microchemical Analysis of Coal and Coal Products*, Carnegie Tech.
Natural Advantages of Anthracite*, Mellon Inst., for Anthracite Industries.
Oxidation of Coal by Alkaline Permanganate (1934)*, Carnegie Tech.
Oxidation of Coal by Gaseous Oxygen (1931)*, Carn. Tech.
Oxidation of Coal by Nitric Acid (1931)*, Carnegie Tech.
Preparation and Study of Solutions of Pennsylvania Bituminous Coals*, Penn State.
Solvent Extraction of Coal (1931)*, Carnegie Tech.
Statistical Studies of Ultimate Analyses of Illinois Coals (1940), Ill. Geol. Surv.

Combustion of Coal and Coal Products

(See also *Domestic Furnaces, Physical Tests for Coal*)

Absorption of Radiant Heat in Boiler Furnace, A.S.M.E.
Action of Organic Sulphur in Gaseous Fuels on Glazes During Firing*, U.S.B.M. and Univ. of Md.
Application of Ignitability Test to Coking, H. Porter.
Burning Characteristics of Colloidal Fuel: (a) in Spark Ignition Engines; (b) Diesels and (c) in Fuel Burners*, Dept. of Chem., Kan. State Coll.
Burning Characteristics of Packaged Coal†, Battelle Mem. Inst.; privately sponsored.
Burning Characteristics of Pulverized Coal†, Battelle Mem. Inst.; privately sponsored.
Burning Solid Fuels on Traveling Grates*, U.S.B.M.
Coal Softening and Its Effect on Stoker Operation With Preheated Air‡, Am. Eng. Co.
Combustibility of Granulated Coal*, Babcock & Wilcox Co.
Combustion of Lignite and Sub-Bituminous Coal*, U.S.B.M.
Combustion of Pulverized Coal*, Carnegie Tech.
Development of Pulverized-Coal-Fired Boilers for High Rates of Combustion Suitable for Locomotive Service*, Babcock & Wilcox Co.
Effect of Chemical Additions to Coal for Pulverized Firing†, Battelle Mem. Inst.; privately sponsored.
Effect of Design and Operation on Mechanical Loading of Distributing Pushers in Multiple-Retort Underfeed Stokers*, Am. Eng. Co.
Effect of Molybdenum Sulphide and Oxide on Combustion of Coal*, Dept. of Chem., W. Va. Univ.
Field Survey of Combustion Space Requirements of Bituminous Coal Fired by Underfeed Stokers†, Battelle Mem. Inst.; many sponsors.
Flow of Coal in Retorts of Multiple-Retort Underfeed Stokers*, Am. Eng. Co.
Flow Beds With Aid of Moving Pictures*, Am. Eng. Co.
Fuel Purchases for Government Establishments*, U.S.B.M.
Fuel Engineering Service to Government Establishments*, U.S.B.M.
Furnace Temperatures in Pulverized-Coal-Fired Units*, Babcock & Wilcox Co.
Gaseous Fuels, A.S.M.E.
Ignitability of Coal, Battelle Mem. Inst.
Ignitability of Coals to Be Tested for Expansion and Plasticity*, Com. D-5 Coal & Coke, A.S.T.M.
Ignition and Relative Ignitability of Different Combustibles‡, H. Porter.
Improvement of Pulverized Coal Burners*, Babcock & Wilcox Co.
Mechanism of Combustion of Volatile Matter (1935)*, Carnegie Tech.
New Method of Test for Ignitability of Solids, H. Porter.
Performance of a Residential Stoker†, Battelle Mem. Inst., privately sponsored.
Photographic Methods for Studying Combustion of Coal on Stokers and in Pulverized-Coal Furnaces, Consolidated Edison Co. of N. Y.
Pulverizers*, Babcock & Wilcox Co.
Rates of Reaction of Solid Fuels With Oxidizing Gases (1931)*, Carnegie Tech.
Rectangular Retort Adaptable to Narrow Sectional Boilers*, Anth. Industries Lab.
Relation of Combustion Space and Setting Height to Smoke When Firing Bituminous Coal With Underfeed Stokers†, Battelle Memorial Inst., for Stoker Mfg. Assn.; Nat. Coal Assn.; Inst. of Boiler and Radiator Manufacturers; Steam Heating Boiler Inst.; Smoke Prevention Assn.; Com. of Ten—Coal and Heating Industries.
Relation of Ignitability to Chemical Composition and Chemical Structure, H. Porter.
Relation of Ignitability to Physical Character of Same Material, H. Porter.
Relative Fluidity or Plasticity of Bituminous Coals When Heated With Regard to Behavior of Stoker Coals, H. Porter.
Small Stokers for Strongly Coking Coals†, Battelle Mem. Inst.; privately sponsored.
Studies of Correlation of Agglutinating and Agglomerating Index With the Caking Action of Fuels in the Furnace*, U.S.B.M.
Temperatures and Gas Compositions in Fuel Beds (1937)*, Carnegie Tech.
Two-Stage Furnace and Open-Pass Furnace for Pulverized Coal*, Babcock & Wilcox Co.

Domestic Furnaces and Boilers

Anthracite Bins†, Mellon Inst., for Anthracite Industries.
Automatic Comfort Heating*, Penn. State.
Burning Characteristics of Anthracite*, U.S.B.M.
Burning of Anthracite Under Various Conditions in Heating Boiler Furnaces*, Sch. of Eng., Yale Univ.
Burning of Iowa Coal in Domestic Furnaces, Iowa State Coll.
Burning Characteristics of Coals in Stokers for Domestic and Industrial Use*, Dept. of Mech. Eng., Univ. of Kan.
Chimney Design and Performance*, Anth. Industries Lab. with Am. Soc. of Heating and Ventilating Engineers.
Combustion of Coal in Residential-Type Mechanical Stokers*, N. W. Exp. Sta. U.S.B.M. with Univ. of Wash.
Draft Control for Small Boilers*, Anthracite Industries Lab.
Evaluating Performance of Water Heaters Fired With Solid Fuels†, Mellon Inst., for Anthracite Industries.

Gravity Ash-Removal Methods†, Mellon Inst., for Anth. Ind.
Suitability of Coal for Small Stokers†, Battelle Mem. Inst.; independently sponsored by several sponsors.
Size Degradation of Coal in Domestic Bin-Feed Stokers†, Mellon Inst., for Anthracite Industries.
Testing of Domestic Boilers for Standardization of Their Output Ratings*, Anthracite Industries with Inst. of Boiler and Radiator Mfrs.
Tests of Secondary-Air Devices for Domestic Furnaces*, U.S.B.M.
Use of Iowa Coals in Domestic Stokers*‡, Iowa State Coll.

Equipment and Material for Mines

Aging Tests for Canisters of Gas Masks*, U.S.B.M.
Analysis of Explosives, U.S.B.M.
Analysis of Power Consumption by Coal Mining Equipment, U.S.B.M.
Approval Tests of Devices for Respiratory Protection*, U.S.B.M.
Collection and Testing of Field Samples of Permissible Explosives*, U.S.B.M.
Comparison of Ballistic Mortar and Ballistic Pendulum*, U.S.B.M.
Construction of Explosives Cars*, U.S.B.M.
Diesel Mine Locomotive Hazards*, U.S.B.M.
Efficiency and Cost of Welded Rail, Especially for Mine Use*, Coll. of Eng., W. Va. Univ.
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* Items starred indicate that work on such projects was still continuing at close of 1939.

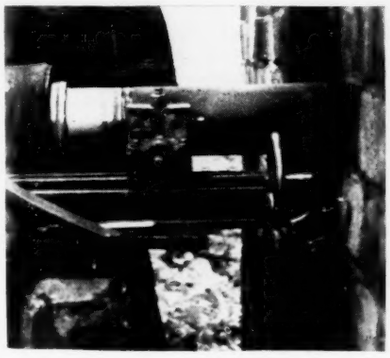
† Items marked with a dagger were concluded in that year.

‡ Items marked with a double dagger indicate that a report probably will be made in 1940. Figures shown in parentheses against name of project indicate year in which the particular project was started. Absence of notation indicates the informant failed to indicate year of initiation or status of project. Certain of the items in the listings might with almost equal propriety be grouped under some other heading. Where the project is of multiple interest or where it cannot be listed under any one subject, it is placed under "Surveys" or "Miscellaneous."

WHAT'S NEW IN OPERATING IDEAS

Fan Shaft Built Up in Place By Metallizing Process

"Some time ago, one of our local coal companies redesigned a large ventilating fan, installing a Venturi inlet and equipping the shaft with ball bearings," writes F. F. MacWilliams, Johnstown, Pa. In order to get the best efficiency the fan rotor was supported by two sturdy bearings just outside the casing and the shaft was extended into the substation building, where an outboard bearing supported the large driving pulley. After considerable service, the middle ball bearing failed in operation and wore the shaft very badly before it was discovered. Ordinarily this would be built



Starting finishing cut on metallized area.

up by welding, but to do this without springing the shaft would be a ticklish job, and if the shaft should get even a few thousandths of an inch out of line it would have to be taken into the shop for repairs. This would be a long and expensive job, since the fan casing would have to be torn out and the large pulley taken off.

"Fortunately, a metallizer was available, and it was decided to use this in the repair. This is one of the newer tools by which rod of various metals is melted in the gun and sprayed onto the work by compressed air. A portable turning tool, used for turning commutators, was mounted firmly on the bearing pedestal in line with the shaft and a small motor belted to the shaft with a pulley ratio such as to give the proper speed. A portable air compressor then was brought to the substation and we were ready to start. After turning a ragged thread, as required for metallizing, the metal spray gun was set up and the shaft built up slightly oversize. The turning tool was again brought into service to machine the fit to size.

"Total spraying and machining time was only three hours and there was, of course, absolutely no danger of throwing the shaft out of line. Moreover, the necessary equipment was easily brought in and set up, although the installation is many miles from any shop. In fact, the total setting-up time was less than eight hours. The picture shows the job practically complete as the finishing cut was started. This is one of the many ways in which modern mining is adapting the latest tools for economical and efficient repairs."

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Stretcher Held in Mine Car By Spring Suspension

Inclusion of spring attachments with each mine stretcher outfit is recommended by J. B. Long, secretary, Long Super Mine Car Co., Fayetteville, W. Va. These attachments, four in number, hook onto the stretcher handles and over the sides of the car, as shown in the accompanying illustration. Thus, the stretcher may be swung in any car in the mine and the springs take up the shocks, which otherwise would be harmful to an injured man.

Pointing out that in order to prevent aggravation of injuries in transporting men to the outside some mines have gone so far as to develop special hospital cars on spring trucks, etc., which are kept in special places for use only in case of an accident, Mr. Long remarks, however, that it is his feeling that the idea of spring attachments for a stretcher "is more flexible and universally applicable. In a sense, it makes every car in the mine a potential hospital car. After some experimenting I believe that the best spring to use is a $\frac{3}{16}$-in. wire-tension spring with an outer diameter of $1\frac{5}{8}$ in. and an over-all length of 11 in. This will give about a 1-in. deflection under a 200-lb. load.

"Also, I think it advisable to put a piece of small chain in the spring in such a manner that the spring will be stopped after a certain extension. Too much stretching might have a tendency to throw the load back too hard. Such a spring set-up is very inexpensive. The necessary hooks and rings can be made by any blacksmith to suit the cars at his mine. We recommend a set of springs with each stretcher in the mine."

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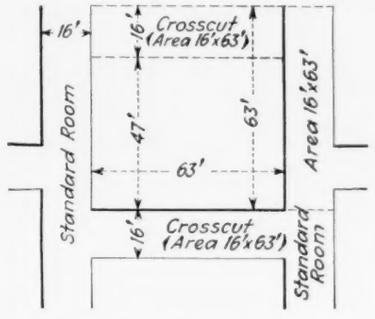
Two Working Places Per Room Customary in Nova Scotia

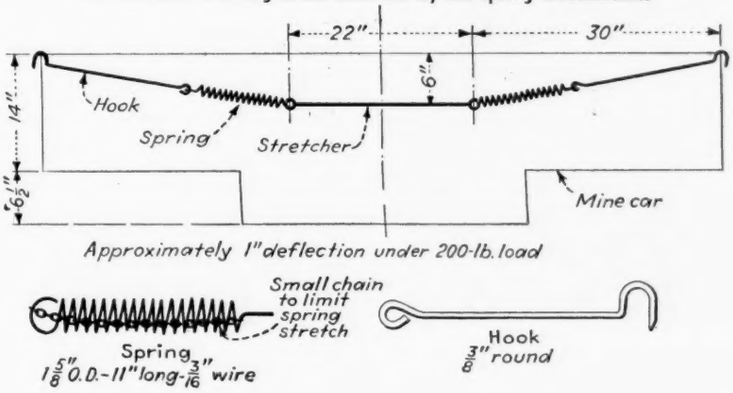
Concentration of operations, so desirable to reduce costs, is a difficult matter where, as in the Nova Scotian submarine workings, pillars must be left to sustain the weight of overburden, both solid and



The distance through room pillars is made 16 ft. longer than the distance between crosscuts so that crews will be equally long driving both.

liquid. For instance, where the solid cover is 650 ft. and over and the coal is 7 ft. thick and over, the pillars left are 47 ft. long and 63 ft. wide, the length being given

The stretcher is swung in the mine car by the spring attachments.



as in the direction in which the room is being driven (see illustration). In this case, 59.5 per cent of the coal is left in place—an extreme instance, though more coal has been temporarily left where prompt pillar recovery has been planned.

Rooms and crosscuts both are 16 ft. wide and, for that reason, the latter constitutes a working place which in a foot-for-foot advance affords as much coal as the room itself. It will be noted that the pillar is 16 ft. wider than it is long, and this is true of all room pillars no matter how thick the coal or the cover.

As no crosscut can be started until the room has been driven entirely past its location, the length of the room beyond the crosscut before another is broken off will be 47+16, or 63 ft.; the crosscut will be equally long. The men in the crosscut, therefore, will find a new working place waiting for them when they clean up the earlier one, if both gangs of men are equally active.

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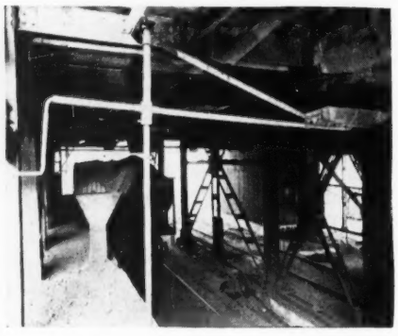
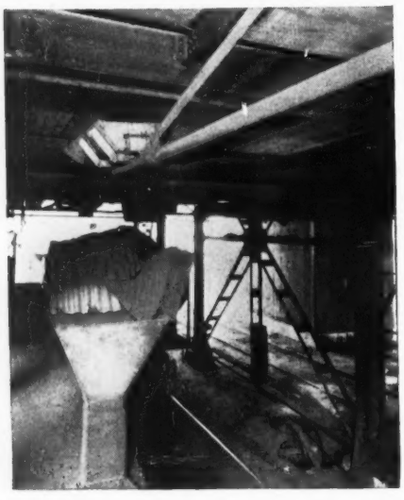
Cut-Stream Sampler Worked From Trimming Platform

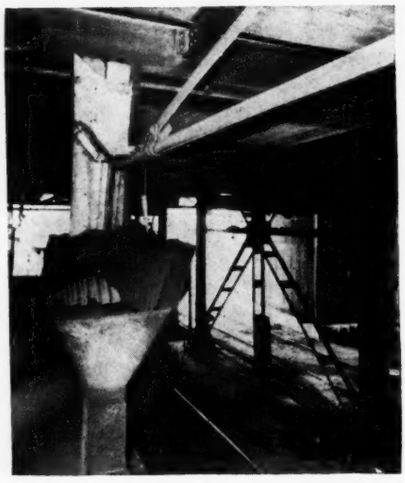
Efficient performance, time saving, convenience and safety are advantages of a sampler in use at the Island Creek Coal Co.'s Mine No. 22 preparation plant, Logan County, West Virginia, installed to cut samples from the stream of coal flowing into the railroad car from a chute over the nut-slack track. A pan 15 in. wide, 42 in. long and 6 in. deep with straight ends and sloping sides is mounted on a long horizontal arm which is attached to a vertical shaft pivoted at top and bottom. A portion of the arm extending back of the vertical shaft serves as a lever and handle by which the man taking the samples swings the arm and pan while standing on the sampling and trimming platform. This part of the arm



Pan has been swung to position under chute.



Pan swung back over the receiving hopper and chute.



When a pin is pulled the pan tips and dumps into the hopper.

is offset at the end to position the lever out of the way above a man's head and keep the handle down at convenient height.

After the pan is filled by two quick swings or cuts through the stream it is swung back over a hopper at the top of a chute. Then, when a locking pin is pulled, the pan tips on a pivot to dump its load. Pipe was used in building the principal parts of the structure supporting the pan.

Including the hopper at the top, the chute is 8½ ft. long and it terminates 29 in. above a sacking platform which is a few inches above ground level. This chute is 8x8 in. and the bottom end is fitted with a slide valve used in filling sacks from the accumulation of coal in the chute and hopper. Mines Nos. 14 and 20 also are equipped with samplers of the same general design.

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Locomotive Auxiliaries Available To Cut Maintenance Cost

"Many a mine executive has looked over his cost sheet and wondered why mine locomotive upkeep is so high," declares Fred W. Richart, Carterville, Ill. "Generators, converters and transformers run year in and year out with but the occasional renewal of a bearing, a few brushes or the cooling oil. Such a contrast may call for an S O S to the chief electrician and a demand, 'Sam, is there a way to reduce our locomotive maintenance?'

"Sam probably knows there are two definite reasons for the disturbing figures on the cost sheet. The first reason is that repair is put off until it becomes a major operation. The pretext may be one of several, such as 'We can't interrupt production'; 'We can't afford to pay overtime'; 'We can't buy parts till we're out of the red.'

Home Work

Mighty feats in the fields of coal cutting, drilling, loading and the like have been performed in chin-fests on the front porch. But it should not be concluded that such home work in useless, because out of it often comes a good idea for cheapening mine cost or promoting safety. And front-porch sessions can be supplemented by following the published ideas of other men on the firing line. Presenting such ideas in readily usable form is the purpose of this department, and in this we solicit the help of operating, electrical, mechanical and safety men at the mines. Send in your kink for cutting cost, saving time or making things safer. Include a sketch or photo if it will help in making it clearer. For each acceptable idea, Coal Age pays $5 or more on publication.

"While the hammer-and-tongs ideas of past decades are disappearing, there is still too much of the psychology of the old-time Scottish mine manager who, when the electrician asked for the locomotive for ten minutes to make repairs, retorted: 'T' hale wi' the motor! Get tha coal!' Too many mining men have yet to learn that 'a stitch in time saves nine.' Twenty years of sales experience covering locomotives and parts and the observed practice of many coal operators are convincing evidence that it is cheaper to keep a locomotive up than to fix it up.

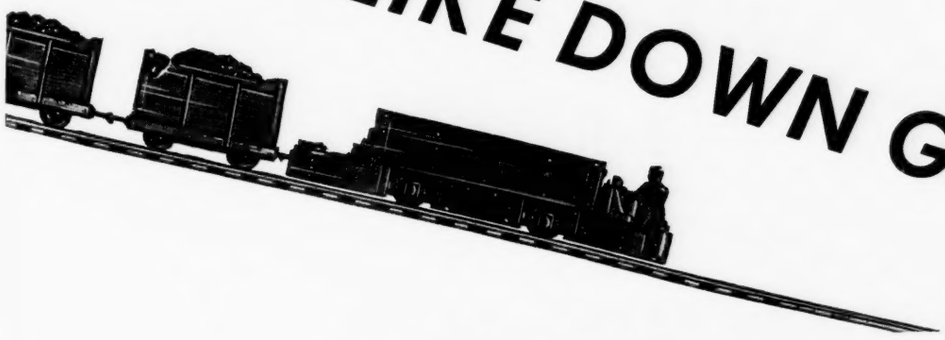
"The second reason lies with the manufacturers, who did not learn how to build locomotives until some ten or twelve years ago. Few locomotives have been sold within that period, so most coal operators have had no actual experience with really modern locomotives. However, such experience does exist and ten years of service with practically no upkeep cost has been demonstrated.

"Every highway traveler is familiar with the paint manufacturers' slogan: 'Save the surface and you save all.' That is literally true of the major wearing parts of a mine locomotive when restated as follows: '*Preserve the bearings and you preserve all.*' Modern locomotives have the major bearings designed and built to keep dirt and grit out and the lubricant in. That is the whole secret. The fact that these bearings preserve shaft centers is responsible for vastly prolonged gear life.

"Roller-bearing journal boxes have a demonstrated life of ten years. Why not twenty? Grease-sealed long-sleeve axle bearings and grease-sealed labyrinth frame heads have an equal record. Gears used with such a bearing assembly have an expected life of twenty years. Indeed, appearance indicates 30 or 40 years. Most new locomotives are so equipped as standard practice. Fortunately, it is possible to transform many of the older locomotives to this form of construction.

"There are many other modern improvements that will help the figures on the cost sheet. Rustless-steel resistors of the ribbon or grid type have already become an ac-

ALL GRADES SEEM LIKE DOWN GRADES



. . . WHEN YOU'RE USING EXIDE-IRONCLADS

JUST as the powerful engine of a modern automobile seems to flatten out the hills on street and highway, the giant power reserve of Exide-Ironclad Batteries makes light, speedy work of underground haulage regardless of loads or grades. In practical terms this means more coal moved from face to tipple in less time.

Exide-Ironclad Batteries not only help to increase production, but they help to reduce costs. They are trouble-free, easy to maintain, and their useful life is so long that they far outlive their guarantee in the service of many operators. You can be sure that this investment in superior haulage performance will be well spread out over the years.

These are among the chief reasons why there are more Exide-Ironclads used in storage battery Locomotives than all other makes combined. Write for free booklet, "The Storage Battery Locomotive for Underground Haulage."

Exide
IRONCLAD
BATTERIES
With Exide **MIPOR** Separators
"MIPOR," Reg. U. S. Pat. Off.

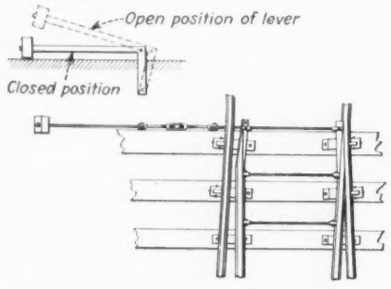
THE ELECTRIC STORAGE BATTERY COMPANY, Philadelphia
The World's Largest Manufacturers of Storage Batteries for Every Purpose
Exide Batteries of Canada, Limited, Toronto

cepted standard. Cast-grid resistors are definitely on the scrap heap. For main-line service such improvements as blowers, contactor control and slider trolleys have demonstrated their value. Transportation costs can be lowered."

•

Gravity-Controlled Throw Keeps Switch Closed

Pointing out the advantages of a switch with a positive means of keeping it closed for use where shop tracks and the like come out on the main line, E. A. Smith, chief engineer, Central Elkhorn Coal Co., Estill, Ky., submits a description of such a switch, which is used at his company's No. 4 mine. Details are shown in the accompanying sketch. In operation, the switch throw must be held up by the coupler or brakeman to let machines onto the main line. When it



When released, the weight closes the switch against the shop track.

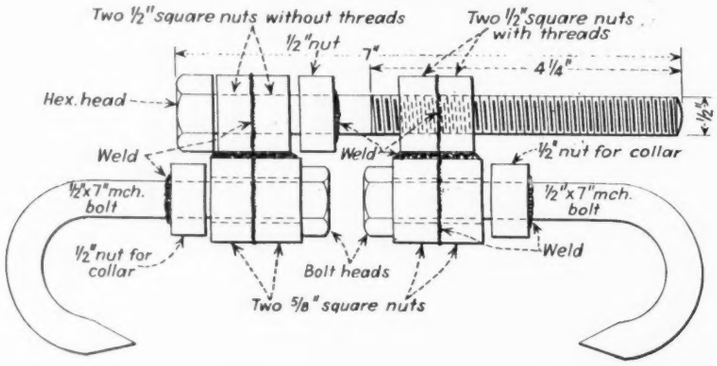
is released, the throw drops back by gravity to align the switch for the regular main-line traffic. Thus, the switch always is closed unless held open by hand. The desired result is attained by a weight on the end of the throw, which may be adjusted as desired for smooth operation and positive closing.

•

Fastening Truck Chains Aided By Special Mine-Made Tool

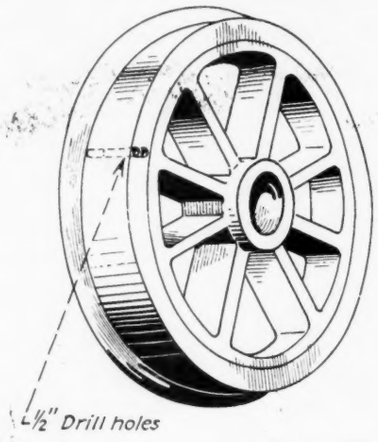
For coupling the truck chains of 35-L and 35-BB Jeffrey and Goodman mining machines, or similar chains, E. C. Hitchcock, mine electrician, New River Co., Summerlee, W. Va., offers the tool shown in the accompanying illustration. This tool, Mr. Hitchcock points out, can be made in a short time from scrap, is light in weight and can be easily carried in the tool bag for jobs away from the shop.

This tool eases the couplings of truck chains.



Locomotive Tires Removed With Dynamite Charges

"The tires on our 6- and 8-ton electric haulage locomotives had been lathe-trued several times and required replacing," states Paul C. Ziemke, Milwaukee, Wis., and, as cutting through the tough metal with a torch proved tedious and time-consuming, a new stunt was tried. Two



The holes for charges are lined up with a spoke.

½-in. holes in line with a spoke were drilled half way through the tire. Each hole was tightly filled with 60-per-cent gelatin in which an electric cap was buried. Turning on the power exploded the charges and "neatly cut the tire."

•

Prevent Conveyor-Bolt Losses With Old Shooting Wire

Every time a conveyor is moved and set up in a new heading or room it usually is discovered that pan bolts and nuts are missing or that some of the bolts are present but not the nuts, writes C. E. Jones, Stirrat, W. Va. This results from the fact that vibration while the conveyor is in service causes some of the nuts to loosen and fall off regardless of how tightly they may be put on, and also from the fact that nuts and bolts are mislaid in moving.

To prevent nuts working loose while the conveyor is in service, suggests Mr. Jones, leg wires from electric detonators should be wrapped twice around the bolt after the nut is put on. These leg wires should be gathered up after each shot and wrapped around a post so that a store is handy when it comes time to put on a pan. Then, when the conveyor is taken apart, the bolts should be placed in the ends of the pans and the same procedure of wrapping them with leg wire followed. This prevents their dropping out when the pans are being moved. Only a few minutes a day is required for this operation while a room is advancing, while the time spent in securing the bolts in moving cannot be noticed.

•

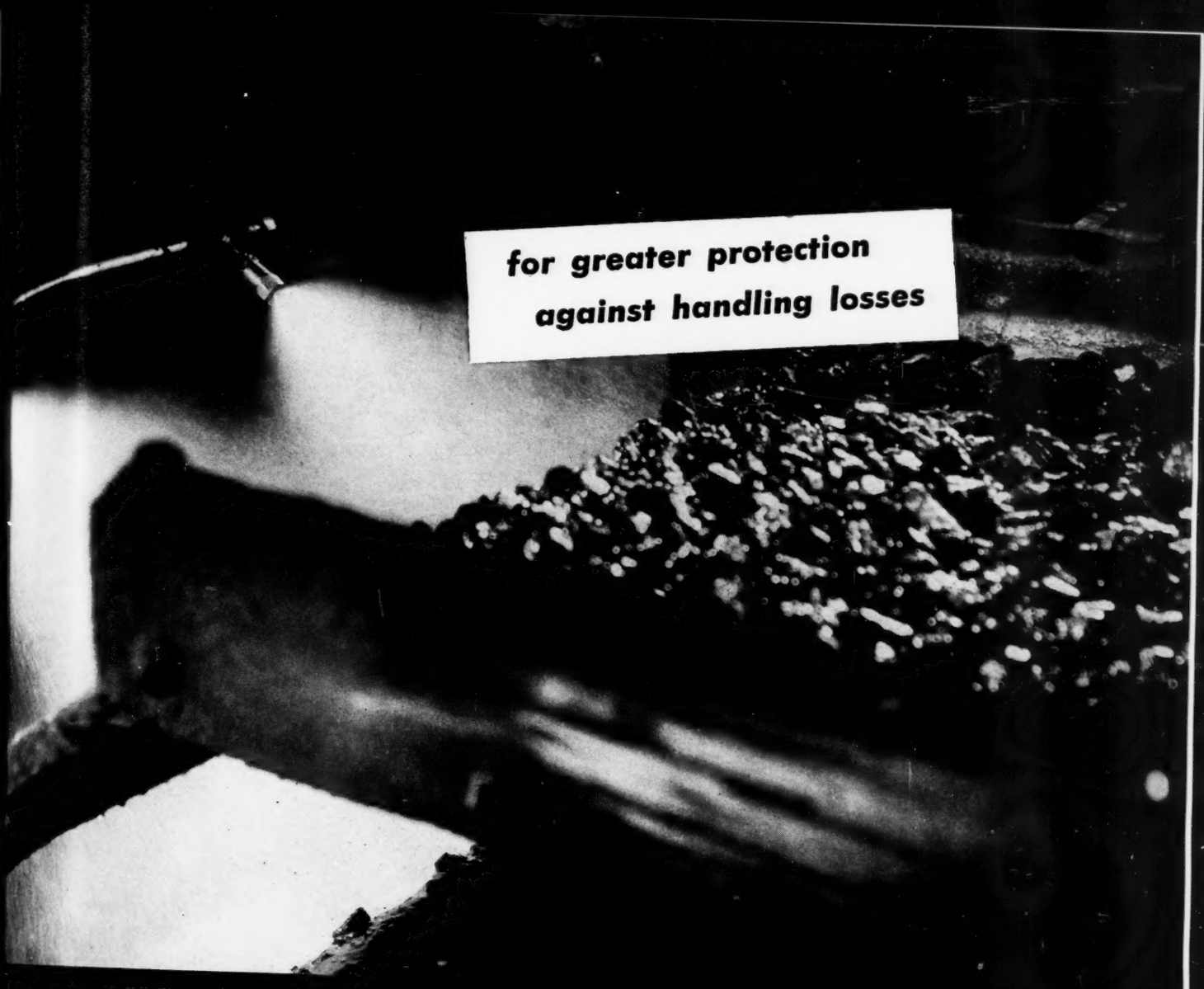
Shock-Impact Mountings Reduce Conveyor Belt Wear

Severe impact at loading point is one of the major causes of belt failures, declares Paul W. Van Orden, manager of Belting Division, B. F. Goodrich Co., Akron, Ohio, in discussing shock-impact mountings for belt-conveyor idlers. "Many people have the erroneous idea that because rubber is highly elastic it is compressible. Fact is that rubber is not compressible and must absorb shock or impact by distribution of the load over an area larger than the actual point of impact. In general, it can be said that the ability of rubber to absorb impact varies as the square of the increase in thickness. Thus a ¼-in.-thick belt cover can absorb four times as great an impact as a ½-in. cover; a ⅜-in. cover, nine times as

Fig. 1—Shock-impact mountings in use.

much impact as one ⅜ in. thick. Within its ability to distort freely and distribute impact a belt cover will not be injured. Beyond this limit, the cover may be ruptured and the belt carcass cut and gouged.

"To minimize impact, material should be loaded onto a belt as gently as possible. This requires sufficient headroom to properly install the correct chute, grizzly, vibro-feeder, reciprocating shaker, pan conveyor or other type feed." The material should hit midway between two supporting idlers so that the belt can deflect downward when struck by large lumps. The deflection is similar to a ball player letting his arm recoil when catching a baseball. If the load is applied directly over an idler, lumps strike the belt like hammers on an anvil.



NEW COAL SPRAY OILS

Standard Oil Company's New Vapor Oils

STANDARD'S New Vapor Oils offer definite improvements in coal spraying that protect against handling losses.

They *spread or creep* over the coal and thoroughly seal it against alternate drying and moisture absorption, reducing breakage.

They *cling* to the coal, giving more lasting protection against deterioration through drying and oxidation in storage.

They are *easier to apply* than wax type products or oils not produced exclusively for coal spraying use.

Their cost is insignificant compared to the actual money-saving.

Let a Standard Lubrication Engineer suggest methods of application to fit your particular job. Write Standard Oil Company (Indiana), 910 S. Michigan Avenue, Chicago, Ill.

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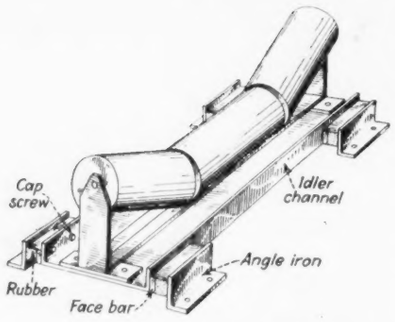


Fig. 2—Application of the shock-impact mounting.

"Under ideal loading conditions, mountings for conveyor idlers may be unnecessary. However, where ideal design is impossible or an original design proves faulty, belt life can be greatly increased by the use of shock-impact mountings. Principal methods of absorbing impact are:

"1. Rubber-covered conveyor idlers immediately beneath point of feed.

"2. Idlers made by assembling T-shaped rubber sections on a shaft.

"3. Idlers mounted on a bed or frame supported by metal springs.

"4. Idlers formed of small pneumatic tires on shafts.

"5. Shock-impact mountings.

"Impact must be transmitted to a rubber covered idler directly through the conveyor belt, the belt itself absorbing a good portion of the impact. The idler covering should be as thick as practicable to provide adequate cushioning. A solid-rubber idler with only the supporting shaft of steel is preferable to the conventional idler with relatively thin cover. The design of the T-shaped segment idler is to provide for greater movement of the rubber, approximating the result obtained by use of a pneumatic tire. Spring-supported frames and pneumatic-tire idlers prove satisfactory but usually are expensive. Shock-impact mountings (Figs. 1 and 2) permit the entire belt, idler and frame to recoil from impact, the recoil being absorbed by the movement of the rubber in the mounting. Because this rubber is in shear, not in compression, it distorts easily and absorbs impact without damage to the belt cover. Excellent results have been obtained with this simplified mounting and its cost is reasonable."

Normally, four of the mountings are used on each idler frame (Fig. 2). Belt movement plus impact tends to tilt the idler forward. Four mountings prevent this forward movement and also give the best load distribution with adequate idler stability. The mountings are fastened through the angle irons (which are drilled at time of installation) to the conveyor stringer. First it is necessary to mount the idler on a channel iron and then screw the channel iron to the metal face bar of the mounting. The metal face bar is drilled and tapped at the factory and furnished with $\frac{1}{2}$-in.-diameter S.A.E. heat-treated capscrews. When a number of horizontal idlers are located immediately below the loading point and too close to permit the placing of each idler on four mountings, a special application may be made. A single long mounting can be placed parallel with the edge of the belt and the supporting idler frame attached to it.

"Varying amounts of impacts are provided for by changing the length of mountings. For belts 48 to 60 in. wide, 4-in.-long mountings usually are sufficient for light impact: 6-in. mountings, fairly severe impact. For extreme conditions, 8-in.-long mountings may be used. On narrower belts shorter mountings are used. Where an extreme oil or grease condition is encountered, a metal shield can be inserted between the idler channel and face bar for adequate protection of the rubber."

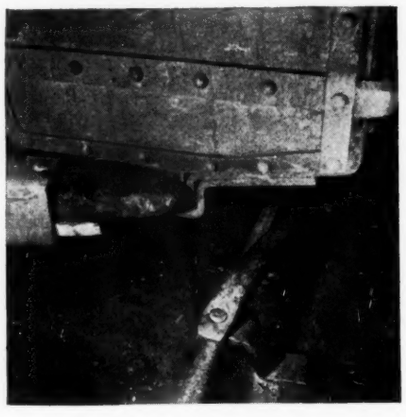
•

Retrackers of Light Weight Appreciated by Motormen

Light weight is a feature of retrackers made and used at Mine No. 20 of the Island Creek Coal Co., Holden, W. Va. Since their adoption practically no supervision is required to assure that motormen carry them on their locomotives without fail. No longer do the motormen shirk handling and replacing them on the locomotives, as some were inclined to do when using a heavier type of retracker formerly supplied.

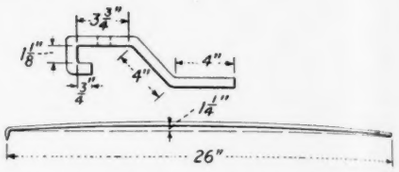
The retracker (see illustrations) consists of two main parts, one a curved bar made from the ball of an 80-lb. rail and the other a clamp forged from $\frac{3}{4}$x3-in. iron. The two are riveted together but the rivet is left loose enough so that a man can rotate the clamp 180 deg., thus adapting the retracker to use on either the right or left rail.

Two points are forged onto the end of the bar and when replacing a car on the track the retracker is positioned with the points on top of a wooden tie so that the weight sinks the points and prevents slipping. On the design first tried the ball portion of a 60-lb. rail was used, but it proved too weak for replacing a 6-ton gathering locomotive.



Retracker in position for use.

Showing points on the end of the bar and the clamp turned part way around.

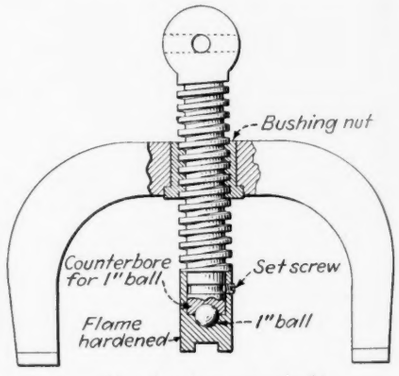


A curved bar 26 in. long cut from a 60-lb. rail and a clamp shaped from $\frac{3}{4}$x3-in. stock are the principal parts.

•

Rail Benders Reconditioned With Ball Bearings

A rebored rail bender fitted with a bushing nut pressed into the frame and welded on the end to prevent it from turning is shown in the accompanying sketch, which was submitted by Victor Exner, Jr., Barton, Ohio. Both the screw and the screw head are made from old armature shafts. "The screw," says Mr. Exner, "is what I call half-V half-square thread. This type of thread will outlast the square thread four to one. Some of our benders have been in use for five years and still are as good as new. And the ball bearing in the end makes them easier to turn. It costs us about $18 to repair a rail bender, whereas a new one costs between $26 and $45."

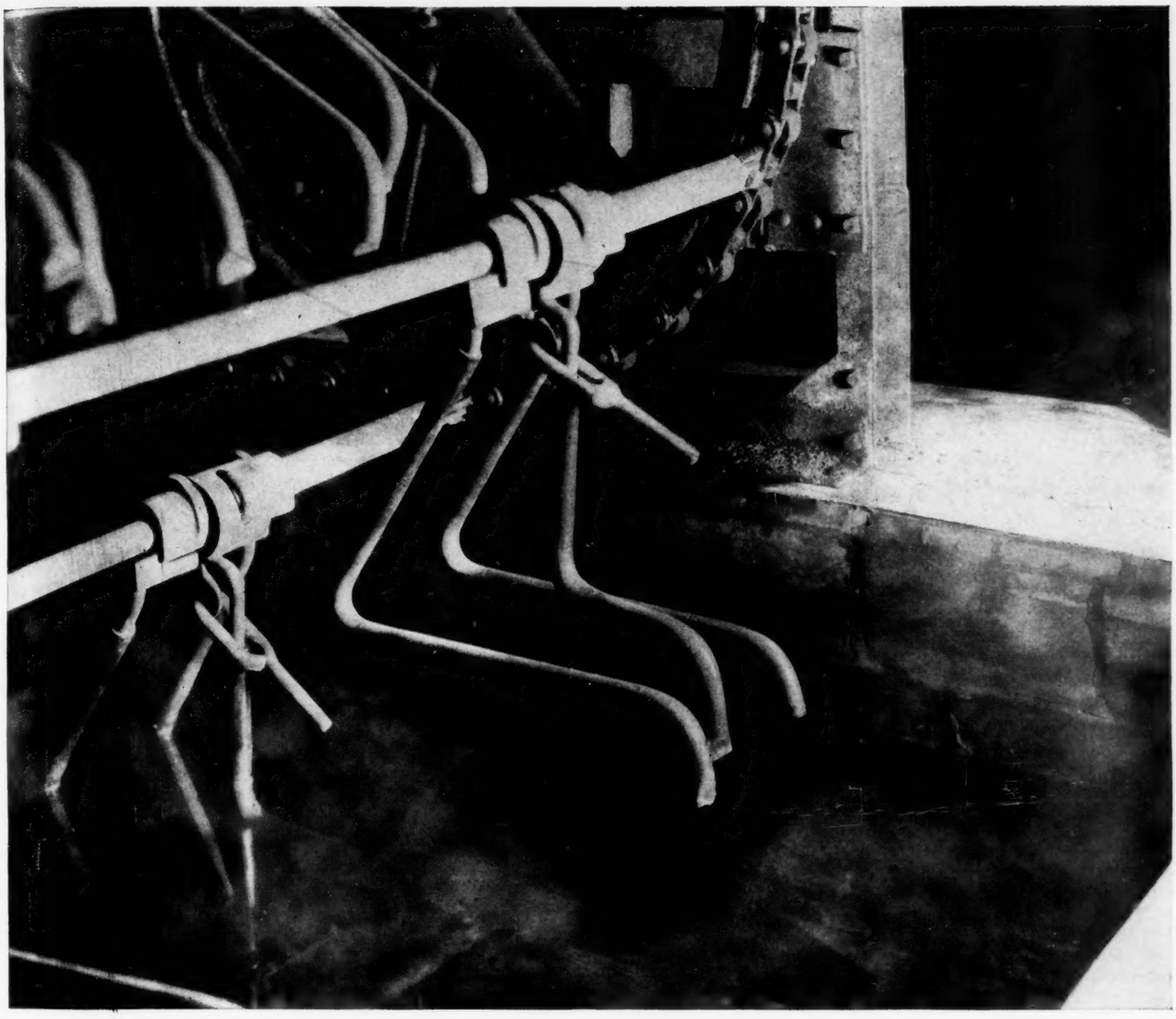


How benders are rebuilt.

•

Self-Latching Mine Door Eases Trip Handling

A trap door which latches itself open and then can be released by a pull on a ring is offered by Carl Donie, mine manager, Little Betty Mining Corporation, Linton, Ind. With this door, the motorman can reverse when the locomotive is only part way through and then can close the door merely by giving the ring a pull. Or if he goes on through, he needs only to reach out and push up the latch. This arrangement, says Mr. Donie, is of great value when it is necessary to put in a door close to the working face and therefore have to switch cars in it, as it saves pulling all the way through or latching the door open by hand, with the



It eats glass— but it's tamed by Goodrich

A typical example of Goodrich product development

HYDROFLUORIC, mixed with nitric, is the "problem child" of acids — nothing would hold it satisfactorily — it even eats glass.

Virulent acids like this have been a major problem in modern industry where they are used hot, in cleaning stainless steel. Rubber tanks handle most acids perfectly but even rubber can't hold chromic, nitric, or mixed nitric and hydrofluoric. Other types of tanks cracked or were eaten away; wood tanks disintegrated and leaked dangerously.

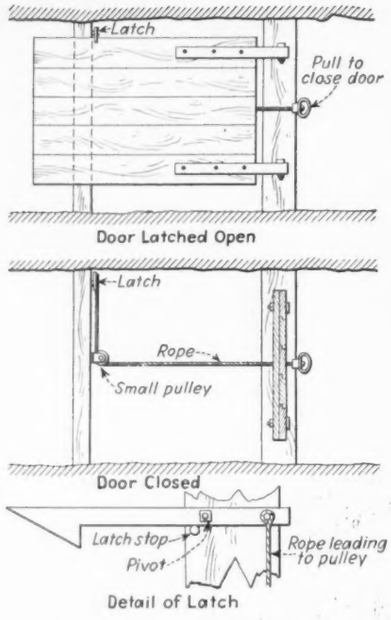
Then Goodrich developed Koroseal —a synthetic with properties which begin where rubber leaves off. Koroseal was tested with every acid that rubber cannot handle — and withstands them all. It even holds aqua regia—the "king of liquids" which dissolves gold. Tanks lined with Koroseal are ending all breakage and leakage problems in chromium plating and stainless steel cleaning. Where other tanks would begin to leak in a few days and disintegrate in a few months, Koroseal tanks have been in use two years without a leak, without a sign of wear or a penny of expense.

Koroseal is a typical example of Goodrich research which is constantly developing new products to meet new needs, and improvements in standard products to make them last longer. All these developments are immediately applied to every product Goodrich makes — which explains why users report that Goodrich belting, hose, tanks, pipe and everything bearing the Goodrich name lasts longer, costs less, serves its purpose better. The B. F. Goodrich Company, Mechanical Rubber Goods Division, Akron, Ohio.

Goodrich

ALL *product problems* IN RUBBER

(Another story of Goodrich development appears on pg. 1)



Showing how the door latch is made and used.

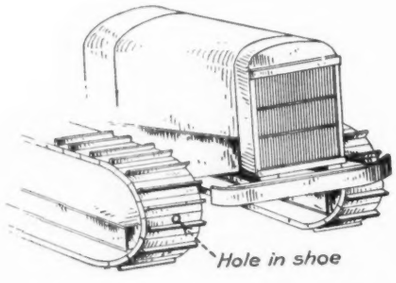
possibility of forgetting and leaving it open. Also, the idea permits the use of one-way, instead of two-way, doors.

As can be seen in the accompanying sketch, the latch is arranged so that it is raised and dropped automatically when the door strikes it, thus holding the door securely. To release the latch, it is pulled up by means of the rope and ring. A stop prevents the latch from falling down into an unworkable position.

•

Track Tensioning Done Through Hole in Shoe

Tractor operators now do not have to get down in the mud to adjust the inner-track tension bolt on a tractor, states Paul C. Ziemke, Milwaukee, Wis., in offering an alternative method. This consists simply of burning (or drilling) a hole in one track shoe in line with the

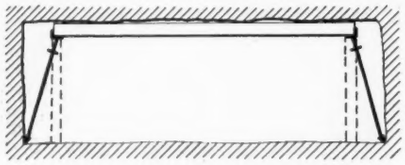


A hole in the track shoe speeds tensioning of inner track.

bolt. A socket wrench with welded-on extension is inserted and the former dirty job is accomplished in one-fourth the time and minus the lurid language which used to accompany it, Mr. Ziemke remarks.

Loader Efficiency Increased By Jacks Set at Angle

In driving 16-ft. headings with track-mounted loading machines in Mine 22 of the Island Creek Coal Co., Holden, W. Va., shoveling of coal by hand from the rib corners has been eliminated by using special jacks under two sets of temporary crossbars next to the face. Wood posts formerly used under all the bars were in the way of the machine and prevented its loading the coal lying close to the rib. When the time comes



Wood posts set vertical were replaced by steel jacks set at an angle.

in each cycle for setting additional crossbars, permanent wood posts are set next to the jacks under the bars already in place and the jacks are removed for use again at the face.

All headings are protected with timber sets 2½ ft. apart and this timbering is kept up to within 8 or 9 ft. of the coal face (when ready to be shot). Wood crossbars

Close-up of a jack supporting one end of a crossbar.

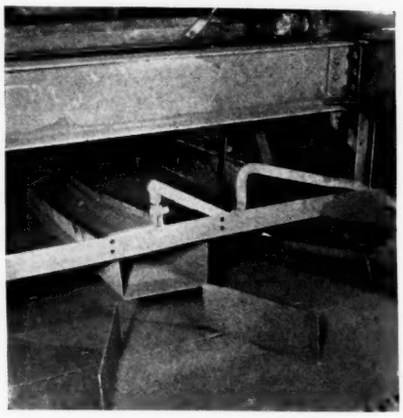
5x7 in. are used but their length is limited to 13½ ft. because the cross dimension of the man-shaft through which they are transported is but 14 ft. Longer bars would entail a much greater expense of handling because they would have to be unloaded from the cars when taken down the shaft.

As indicated in the illustrations, each jack is set at an angle with its foot in the corner. Simplex mine jacks are purchased and altered locally to suit the special duty. To the top is bolted an angle made from ⅝x4-in. stock. The horizontal leg of this angle is 6 in. long and the vertical 4½ in. To the originally flat base of the jack is welded a 5-in. length of 3x3-in. angle with the apex down. Four jacks are required per heading and the total number of these special jacks now in use is 100.

•

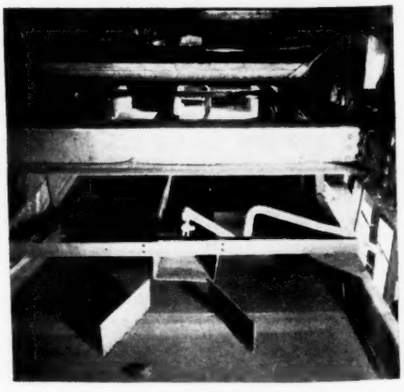
House Coal Taken Off Shakers By Auxiliary Chutes

The problem of taking house coal off shaker screens has been solved at the Continental No. 4 mine, Continental Coal Co., Cassville, W. Va., by equipping the screens with guide plates and auxiliary chutes as shown in the accompanying illustrations. The auxiliary chutes segregate the house coal from the other and carry it across gates, etc., to the bin. Gates in the auxiliary chutes permit dropping the coal lower on the screen in case the upper screen gate is closed, in which case it is necessary to use the auxiliary chutes to prevent coal from stacking up against the movable upper section.



Showing the hinged section at the upper end of the auxiliary chutes, together with the lever used to raise and lower it. When lowered, the hinged section carries the coal across the screen gate and on into the auxiliary chute system.

Two guide plates, as shown, direct the coal off the upper screen into the auxiliary chutes. When these chutes are not in use, a hinged section is raised by means of a lever running out to the side of the screen. With the hinged section up, the coal goes on through the gate to a lower deck of the screen. With the hinged section down, the coal is carried over to the lower chute gate or on to the house-coal bin.



Long-distance view of the auxiliary chute system, showing a lower gate for returning coal to the screen.

WHAT'S NEW IN THE FIELD

Senate Passes Mine Inspection Bill; House to Consider Measure

The Senate at Washington passed and sent to the House on Jan. 18 the Neely bill (S. 2420) giving authority to the Secretary of the Interior to conduct annual, and in some cases frequent, inspection of coal mines. During extended debate, Senators Neely of West Virginia and Reed of Kansas contended that the intention of the measure was not to "direct" the Secretary to make annual safety and health inspections but to "authorize" him to make such inspections where and when he thought necessary in cooperation with existing State agencies. Proponents also pointed out that the Secretary is limited to making inspections, giving publicity to his findings, and reporting recommendations to Congress. An amendment was accepted limiting inspection forces to the appropriations authorized in the annual Interior appropriations.

The bill now is in the hands of the House Committee on Mines and Mining. Action awaits recommendation by the Rules Committee, which comprises the following membership: Democrats—Representatives Smith, West Virginia; Somers New York; Peterson, Florida; Secrest and Claypool, Ohio; Moser, Pennsylvania; Byron, Maryland; Beckworth, Texas; Moroney, Oklahoma; Norrell, Arkansas, and Murdock, Arizona. Republicans—Representatives Dimond, Alaska; Engelbright, California; Robsion, Kentucky; Bradley, Michigan; Landis, Indiana; Lewis, Ohio; Fenton, Pennsylvania, and Winter, Kansas. Progressive—Marcantonio, New York.

Rules Committee members are: Democrats—Representatives Sabath, Illinois; Cox, Georgia; Smith, Virginia; Clark, North Carolina; Dies, Texas; Lewis, Colorado; Delaney, New York; Colmer, Mississippi; Nelson, Missouri; Dempsey, New Mexico. Republicans—Representatives Mapes, Michigan; Taylor, Tennessee; Fish, New York, and Allen, Illinois.

•

New Preparation Facilities

American Rolling Mill Co., Nellis Mine, Nellis, W. Va.: Contract closed with Koppers-Rheolaveur Co. for installation of a Koppers Battelle launder to clean 5/16x0-in. coal.

Hanna Coal Co. of Ohio, Dun Glen No. 11 mine, Dun Glen, Ohio: Contract closed with Morrow Mfg. Co. for mine-run belt conveyor, shaking and vibrating screens, loading booms, conveyors, dewatering screens and wood tipple structure; capacity, 250 tons per hour of mine-run; to be completed Feb. 15.

Jones & Laughlin Steel Corporation, Hazlewood byproduct coke plant, Pittsburgh, Pa.: Contract closed with Koppers-Rhoelaveur Co. for installation of Koppers-Rheolaveur coal-washing plant and extensions to present crushing and storage system; capacity, 6,000 tons per day; to be completed within five months.

•

Setback for Bonneville Project

An expected customer for power from the Government's Bonneville Dam project has been lost with the announcement that the city of Eugene, Ore., has voted to proceed at once with construction of a 7,500-kw. steam standby electric-generating plant. Having counted upon the city as a likely customer, the Bonneville administration several months ago built a transmission line from Vancouver, Wash., at an estimated cost of $2,000,000. The city's water board, however, is reported to have determined that best offers of Bonneville current did not equal the price at which the city could furnish its own additional needs by increasing the capacity of its existing municipal plant.

Keeping Step With Coal Demand

Bituminous Coal Stocks

	(Thousands of Net Tons) Dec. 1 1939	Nov. 1 1939*	Dec. 1 1938
Electric power utilities	8,858	8,370	8,413
Byproduct coke ovens	8,115	7,250	7,173
Steel and rolling mills	665	640	650
Railroads (Class 1)	5,336	5,050	5,311
Other industrials†	14,410	12,960	11,770
Total	37,384	34,270	33,317

Bituminous Coal Consumption

	(Thousands of Net Tons) Nov. 1939	Oct. 1939*	Nov. 1938
Electric power utilities	4,406	4,501	3,530
Byproduct coke ovens	6,457	6,400	4,622
Steel and rolling mills	1,054	980	803
Railroads (Class 1)	7,327	7,450	8,680
Other industrials†	11,002	10,188	9,369
Total	30,246	29,519	24,928

* Revised. † Includes beehive ovens, coal-gas retorts and cement mills.

Anthracite Allocation Plan To Outlaw Price Wars

Competitive price cutting within Pennsylvania's anthracite industry—responsible for heavy losses during the price war last summer—appears to be outlawed under a voluntary production control plan approved by Governor Arthur H. James on Tuesday, Jan. 23. Producers cooperating in the plan are the seven old-line companies and nearly 100 per cent of the independent operators.

The pact provides for establishment of an anthracite emergency committee and a producers' advisory board, these bodies bearing the burden of enforcement. The emergency committee shall consist of nine members appointed by the Governor, three of whom shall be selected from a panel submitted by the cooperating producers and three from a group submitted by the United Mine Workers. The other members will be named by Governor James without consulting either group; he shall also designate one of them as chairman. Seven members of the committee shall constitute a quorum and any order or action must have the approval of at least seven members, "including in any event" the members designated by the Governor.

This nine-man committee will delegate its powers to a three-man group one of whom shall be appointed by the Governor's representatives and one each by the representatives of the cooperating producers and the United Mine Workers who are members of the emergency committee. Members of this committee need not be members of the emergency committee. The executive committee shall act by majority vote, including in any event the member appointed by the representatives of the Governor.

The producers' advisory board shall consist of fourteen members to be selected at a meeting of the cooperating producers. Seven members shall be elected by a plurality vote of all the producers and seven shall be elected upon a tonnage basis. This board apparently will be the policing agency of the agreement.

In determining market demands the advisory board will take into consideration inventories of unsold anthracite in cars at mines or other places by railroad companies, at tidewater piers and lake ports, en route to piers or ports, and anthracite in storage, wherever located. These data will be turned over to the executive com-

mittee, which shall, on Monday of each week, prepare and submit to each cooperating producer an estimate or forecast of the production requirements of commercial sizes for that week for the industry as a whole and for each producer in accordance with his percentage position.

Cooperating companies shall submit periodic reports to the executive committee giving full statistics on commercial anthracite produced, sold and stored, run through producers' breakers, other breakers or prepared after purchase from other mines.

There also are provisions covering revisions of percentage positions. One of these sets forth that "anthracite produced for ground storage in the months of July, August and September, when in excess of assigned tonnage, shall not be regarded as commercial production in arriving at the weekly or cumulative percentage position of the cooperating producer storing such anthracite; provided, however, that the total tons stored shall be deducted on a pro rata weekly basis from the tonnage assigned to said producer by the executive committee during the succeeding five months, beginning Oct. 1 and ending Feb. 28 in each coal year."

Other sections provide for promulgation by the executive committee of "appropriate standards to govern the sizing, purity and grading of commercial sizes of anthracite."

The operators' advisory board named includes: F. W. Leamy, vice-president, Hudson Coal Co.; James Prendergast, president, Susquehanna Collieries Co.; Gordon C. Cooke, president, Delaware, Lackawanna & Western Coal Co.; L. R. Close, president, Lehigh Valley Coal Co.; William Gohl, president, Pattison & Bowns; F. C. Wright, Jr., vice-president, Philadelphia & Reading Coal & Iron Co.; J. B. Warriner, president, Lehigh Navigation Coal Co.; William Burrus, president, Penn Anthracite Collieries Co.; Louis Pagnotti, president, Sullivan Trail Coal Co.; C. A. Garner, vice-president, Jeddo-Highland Coal Co.; R. F. Duemler, sales manager, Cranberry Improvement Co.; C. E. Hildum, president, Coxe Bros. & Co.; J. H. Pierce, president, East Bear Ridge Colliery Co., and C. S. Kenney, vice-president, Weston Dodson & Co.

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To Rebuild Martin Tipple

The tipple of the Martin Mining Co., Martin, Pa., is to be rebuilt. The structure was destroyed by fire of undetermined origin on Dec. 14, with a loss estimated at $70,000.

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Date Set for Industrial Exhibit

The Sixth Annual Southern Appalachian Industrial Exhibit, under the auspices of the Pocahontas Electrical and Mechanical Institute, is announced for Aug. 22-24. As usual, it will be held in the Norfolk & Western freight terminal, Bluefield, W. Va. The sponsors are open to suggestions as to how the exhibit may be improved and be made to serve interested industries better.

United Mine Workers at Columbus Convention Celebrate Golden Anniversary

COLUMBUS, OHIO, Jan. 25—Celebrating its fiftieth anniversary in the city of its birth, the United Mine Workers of America opened its 36th constitutional convention at Columbus Auditorium on Tuesday. Approximately 2,400 delegates from the United States and Canada were present when, after a 6-minute ovation, John L. Lewis, international president, formally announced the convention in session. Most of the opening meeting was taken up with welcoming speeches and committee appointments.

In his address, which climaxed the first session, Mr. Lewis paid tribute to the founders of the union for their vision and urged present-day members to guard the heritage handed down to them. Touching briefly upon the medieval struggles of miners, Mr. Lewis added that even today there were government officials ready to send troops to protect "strangers" who came to take away the miners' jobs. Governor Chandler of Kentucky and Paul V. McNutt, one-time governor of Indiana, were scored on that point, with the major castigation handed out to Mr. McNutt.

Wage Negotiations Reviewed

The joint report of President Lewis, Vice-President Philip Murray and Secretary-Treasurer Thomas Kennedy was the main order of business at the afternoon session. In this 82-page printed document, the international officers reviewed in detail the bituminous and anthracite wage negotiations of last year and touched more briefly on such subjects as competing fuels, the Guffey act, reciprocal trade agreements, the U. S. Bureau of Mines, the Social Security Act, administration of the National Labor Relations law, civil liberties, and internal union problems.

According to the report, the demands presented to the operators at the last Appalachian wage conference "can well serve as a guide in the drafting of future proposals and stand as a bill of particulars for the aims of the union." Reciprocal trade agreements, declared the report, either should be subject to Senate approval or the law delegating authority to the State Department so amended "as to be fully protective of the interests of the industries of this country and their products."

Increased wages for workers in competing fuels and a temporary tax on fuel oil were advocated. Reorganization of the Bureau of Mines and enactment of the Neely-Keller bill were demanded. Payrolls as a basis for social security taxes were condemned because they put the industries in which wages are the major cost item at a competitive disadvantage. "Such taxes," concluded the international officers, "should be derived from increased levies on the upper brackets of individual incomes and gift and inheritance taxes."

"We are serving notice," declared Secretary Kennedy in discussing the section of the officers' report dealing with reciprocal trade agreements at yesterday's session, "that we are not going to stand for the treatment we have gotten out of the making of these agreements in the United States." The disadvantageous competitive position in which the coal industry has been placed under the Canadian, Russian and Venezuelan pacts was specifically cited to prove that the industry's experience with these treaties has been "disastrous."

Scores Bureau of Mines Purge

Administration of the Bureau of Mines and retiring Director Finch were scored by Mr. Lewis, who insisted that the union be consulted before another director is appointed. Opposition of the National Coal Association to the Neely federal mine-inspection bill also was attacked. Local unions were urged to get behind the bill and the House Committee on Rules was warned not to kill it in committee.

Nearly 30 resolutions from local unions urging a tax—in some cases as high as 75c. a ton—on mechanical-loading equipment were disposed of in a substitute resolution presented by the Resolutions Committee, headed by P. T. Fagan, president, District 5. This substitute referred the entire subject to the international executive board with authority to make a proper study and "to initiate any legislative action they may deem advisable after due consideration and study." The substitute resolution, presented at the morning session today, was adopted by the convention.

Minimum prices on bituminous coal will be in effect by April 1, prophesied Percy Tetlow, technical adviser to the Bituminous Coal Division of the Interior Department, in an address on the workings of the Guffey act. Mr. Tetlow, who addressed the convention this afternoon, condemned the actions of the operator groups fighting the present law. Mr. Lewis, in introducing the

Coming Meetings

- American Institute of Mining and Metallurgical Engineers: annual meeting, Feb. 12-15, Engineering Societies Building, New York City.
- Canadian Institute of Mining and Metallurgy: 44th annual meeting, March 11-13, Royal Alexandria Hotel, Winnipeg, Manitoba, Canada.
- American Mining Congress: seventeenth annual coal-mining convention and exposition, April 29-May 3, Music Hall, Cincinnati, Ohio.
- Northern West Virginia Coal Association: annual meeting, May 13, Fairmont, W. Va.
- Mine Inspectors' Institute of America: annual convention, May 27-29, Claypool Hotel, Indianapolis, Ind.
- Stoker Manufacturers' Association: annual convention, June 6 and 7, Hot Springs, Va.

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I sure need some replacements badly!"

When your hard-working Coal Tipple hollers "HELP!"

Judging from the unusual number of inquiries and orders received at the Morrow plant during the past few months, we know pretty well what a high pressure production ordeal your present tipples must be experiencing.

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Morrow's background of 25 years of specialization in the design and construction of hundreds of tipples can be of real value *now*. Why not call in a Morrow engineer for discussion? No obligation, of course.

Rx HERE'S A GOOD MORROW PRESCRIPTION FOR AN "OVERWORKED" COAL TIPPLE:

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- ROTARY DUMPS
- CHUTES
- LOADING BOOMS
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- MORROW-PRINS MULTI-FLOW COAL WASHER

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MANUFACTURING CO. WELLSTON, OHIO

DESIGNERS AND BUILDERS OF COAL HANDLING EQUIPMENT FOR OVER 25 YEARS

speaker, remarked that President Roosevelt, "for some unknown reason," had abolished the Coal Commission with its labor representation and served notice that the union would demand such representation in the framing of any new legislation to take the place of the present law when it expires next year.

The convention, it is expected, will last ten days to two weeks.

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A. M. C. Convention Exhibitors Showing Keen Interest

Confidence that 1940 will show improvement in the coal industry is reflected in the activity of manufacturers planning to exhibit at the Seventeenth Annual Coal Convention and Exposition of the American Mining Congress, to be held April 29-May 3 at the Music Hall, Cincinnati, Ohio. Advance reservations by members of the Manufacturers' Division alone have accounted for more than 50 per cent of the available exhibit space, and indications were that all space will be under contract by the end of January.

Under normal conditions, it is pointed out, the coal industry annually purchases $250,000,000 worth of equipment and supplies, and manufacturers are optimistic that 1940 buying will exceed that amount. With coal production returning to more favorable levels, the industry is forging ahead in its fight to regain markets lost to competitive fuels. At the present time, says the congress, over 25 per cent of our coal production is coming from mechanical operations, as compared with slightly more than 7 per cent in 1929, and this modernization is proceeding at an accelerated pace. This, together with rapid advances being made in coal cutting, drilling, blasting, haulage, surface preparation, etc., will call for increased use of modern and improved equipment of all types.

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Power Conference to Discuss Plant Fuel Problems

A session devoted to discussion of powerplant fuel problems will be a feature of the Midwest power conference, to be held April 9 and 10 at the Palmer House, Chicago. The conference is sponsored by the Armour Institute of Technology in cooperation with Iowa State College, Michigan State College, Purdue University, State University of Iowa, University of Illinois, University of Michigan, University of Wisconsin, Chicago Section, American Society of Electrical Engineers; Chicago Section, American Society of Mechanical Engineers; Western Society of Engineers and other engineering societies.

Included in the fuel session will be the following papers: "Stratification of Gases in Coal-Fired Furnaces," John M. Drabelle, consulting engineer, Iona Electric Light & Power Co., Cedar Rapids, Iowa; "Pulverized Coal," Martin Frisch, chief engineer, boiler and pulverizer division, Foster Wheeler Corporation; "The Gas-Fired Plant and Its Problems," E. L. Tindall, superintendent, fuel and combustion, Carnegie-Illinois Steel Corporation.

Waning War Boom and Hope for Stabilization Quicken Interest in Price Fixing

By PAUL WOOTON

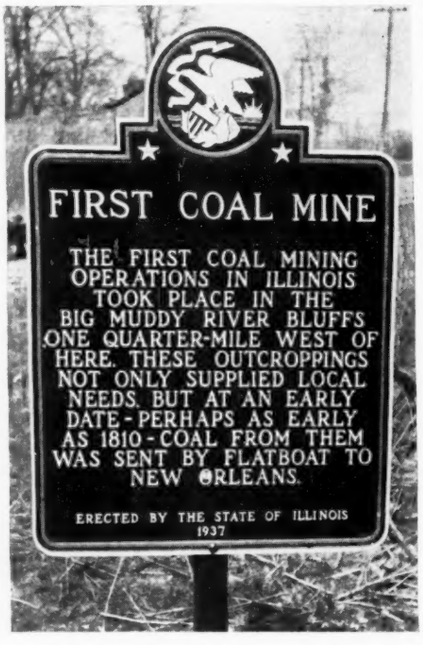
Coal Age Washington Correspondent

INTEREST in the establishment of minimum prices for coal under the Guffey act has been stimulated by the flattening out of the war boom and by the hope that the new prices will have a stabilizing effect on a market showing sagging tendencies. After six months of hearings the structure of prices originally recommended has been modified so as to iron out some of the inequities revealed by the evidence offered. Levels of realization in many instances have been brought more nearly in line with the weighted average cost.

The fundamental idea of the Guffey act is that the minimum prices are to be competitive in the sense of maintaining relative market values and existing competitive opportunities and that the prices are to yield an average income equaling, as nearly as may be, the average cost. The prices evolved appear to meet the requirements of the law. It is not the intent of the law that each district shall obtain an income equal to its own cost. Low-cost districts will continue as before to fare better than high-cost districts and to show a larger margin of realization over costs. There are high-cost districts that will continue to show a loss and which would show a loss under nearly any structure of prices that could be regarded as reasonable. Even between price areas the requirement of competitive balance may prevent average income from equaling exactly the average cost.

As the record stood in December, prices proposed for Price Area 1 were 4c. under the price-area cost. Those for Price Area 2 were 7c. over the price-area cost. Since the mines of Price Area 2 are very low cost on the average, it is doubtful if this condition could be avoided without completely upsetting the competitive relationship between Eastern and Midwestern coals. Taking the entire area east of the Rocky Mountains, however, the structure of prices evolved seems closely in balance with costs. The weighted average realization, after the modification recommended, works out at $2.05 for districts Nos. 1 to 15, inclusive, as against costs for the same districts of $2.072. Over this entire area, which constitutes the great competitive market of the United States, the prices recommended would come within 1.8c. of meeting the average cost. For the industry as a whole, including the Rocky Mountain fields, the weighted average realization is $2.073 and the weighted average cost is $2.088.

Taking the entire structure of prices, the increase to be expected is in close agreement with the yardstick of cost provided in the law. Whatever difference there may be is on the low side rather than on the high side.



Beginnings of Coal in Illinois

Coal mining began in Illinois in 1810. Outcropping of the No. 2 vein just below Murphysboro, in the bluffs near the Big Muddy River, supplied a load shipped by flatboat to New Orleans that year. The *Journal* of the Franklin Institute credits this with being the first mining operation in the United States. The State of Illinois has erected the above historical marker at Mount Carbon, across the river from Murphysboro.

Consumers Want to Know

Consumers are clamoring to know how much the new prices will influence the cost of coal. The average realization from the schedules works out at $2.073 per ton, as mentioned. This figure may be compared with an actual realization of $1.964 per ton reported in 1937 by the commercial mines of more than 50 tons daily capacity. While the two figures are not strictly comparable, they indicate that the new prices run about 11c. a ton higher than the actual prices of the April-December period in 1937. The increase in prices figures out at something like 2½ per cent on the delivered cost of coal.

Many consumers do not realize that more than one-half of what they pay for coal consists of freight charges. The average freight transportation charge per ton of coal hauled is $2.25. Adding to that amount the $2.07, representing the mine price under the proposed schedules, makes the delivered cost of bituminous coal $4.32 per ton. Measured against that cost the 11c. increase amounts to 2.5 per cent.

Obviously all prices are not increased in the same amount. The record seems to show that prices for slack have been raised more than prices of prepared sizes. It is pointed out that this is in line with the long-time

Announcement to the

COAL MINING INDUSTRY

THE FAIRMONT MACHINERY COMPANY of Fairmont, West Virginia announces that, through license agreements secured from the American Coal Cleaning Corporation and the Peale-Davis Company, it has acquired the right to manufacture, sell and install American Pneumatic Separators for use in the dry cleaning of coal.

In addition to this, existing arrangements with the United Engineers and Constructors of Philadelphia, Pennsylvania, licensees for the Chance Sand Flotation System of washing coal, place Fairmont in a position to furnish the Coal Industry complete coal preparation or cleaning plants embodying the use of either or both of these very superior systems for cleaning coal.

Each system, the one wet, the other dry, has its proper application and Fairmont is thus equipped to prescribe fairly and correctly the answer to the Coal Mining Industry's coal washing problems.

tendencies of the market under free competition. As is well known, the spread between the prices of screening and of prepared sizes has been gradually diminishing. Speaking generally, the increases in prices seem to fall on all classes of consumers and on all regions of the country. As long as all localities are treated substantially alike, so that no one region has to pay more than the regions with which it competes, consumers of coal are not likely to complain more than temporarily because of a 2½ per cent increase in price. At the same time that increase is not likely to throw any material amount of business to substitutes.

While the output of coal during the last six months of 1939 was at the rate of 456,000,000 tons annually, no one is prophesying that the output of 1940 will be much better than the 1937 figure of 442,000,000 tons. It now is known that much of the increased purchasing in the latter half of 1939 was to replace drafts that were made on stockpiles during the suspension of operations in April and May. As soon as the lake season closed production fell to a level of 9,000,000 tons per week. The cold snap stimulated the demand for domestic sizes, but screenings again are in oversupply. The outlook for 1940, in the opinion of those who watch such things in Washington, is for the continuance of the sort of market made familiar by the experience of 1936 and 1937. Tonnage will be larger in 1940 than in 1938 but the price outlook is such as to renew interest in the Guffey act experiment.

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Budget Reduces 1941 Funds For Bituminous Coal Division

An allowance of $2,387,800 is set up for the Bituminous Coal Division for the fiscal year 1941 in the appropriation estimates for the Interior Department contained in the budget submitted to Congress by the President. This compares with provision of $3,500,000 for the fiscal year 1940 and $3,250,000 for 1939. The budget figure for the Consumers' Counsel Division is $151,830, compared with $285,000 for the preceding fiscal year and $270,000 for 1939.

Accompanying these estimates was the following explanation: "Decreases are recommended for the Consumers' Counsel and the Bituminous Coal Division. These decreases represent economies resulting from reorganization and the contemplated completion of the work of these divisions by April 25, 1941, the date of expiration of the present law."

The 1941 fiscal year appropriation for the Bureau of Mines is $2,869,360, compared with $2,905,160 for the preceding year. Funds for safety measures and coal research are not materially changed.

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Susquehanna Reacquires Mine

Cameron colliery, Shamokin, Pa., which had been under the management of the Stevens Coal Co. since 1932, has been returned to possession of the Susquehanna Collieries Co. E. G. Erdman, of the Susquehanna company, stated that high taxes made operation of the property a hazardous undertaking.

Gas Explosion in Pond Creek Pocahontas Mine Takes a Toll of 91 Lives

OUT of 138 men working underground in Bartley No. 1 of the Pond Creek Pocahontas Coal Co., Bartley, McDowell County, W. Va., 47 came out unscathed after an explosion Jan. 10, at 2:45 p.m., just 15 minutes before the men of that shift would have quit to give over to a second shift. Among the 91 men killed three were section foremen; G. L. Spence, Alonzo Barnett and Lee Hall. The later had led one group of fourteen men to a point where they had attempted to brattice themselves off, but not early enough to beat the afterdamp.

Apparently the explosion was initiated in a large quantity of gas released by a fresh pillar fall and this ignition happened in a hand-loading section in the western half of the mine, two miles from the shaft bottom. In the eastern section, where the majority of the 47 men saved were working, and which was not affected by the explosion, conveyors driven by storage batteries were in use.

Specifically, the ignition occurred at No. 6 pillar off No. 20 room in the Main Sixth heading. Air samples taken here less than two hours before the explosion and previous to the roof fall, and analyzed in the gas laboratory at the mine had indicated a safe condition. Storage-battery equipment in that section was found in good working order with controllers shut off. Cigarettes found in the pocket of a man's jacket pointed to smoking as a possible cause, although men were regularly searched for matches and smoking materials. That shooting coal was not the cause of the ignition was indicated by the shotfirer being found in the section foreman's office with his battery and shooting cable. All shooting in the mine was done by certified men using permissible explosives detonated by permissible attachments on cap-lamp batteries. Although much violence was evidenced, the effect did not extend all of the way back to the shaft. A second explosion of lesser violence and centered about a mile from the first took place three hours later. Fortunately, at that time rescue crews had not penetrated far enough to be affected.

Rock-dusting, which for years had been a regular practice throughout the mine, is credited with saving the 47 men and the other side of the property. That the explosion traveled so far, about 2 miles through the rock-dusted headings of the affected section, is difficult to explain. Physical damage to the mine and equipment was heavy throughout the affected section, but, as it did not extend to the shaft bottom, the mine ventilating fan was undamaged. The first bodies were hoisted on Saturday afternoon, three days after the explosion, and the last was recovered the next day, Sunday night Jan. 14. Fifty men worked on the rescue crews.

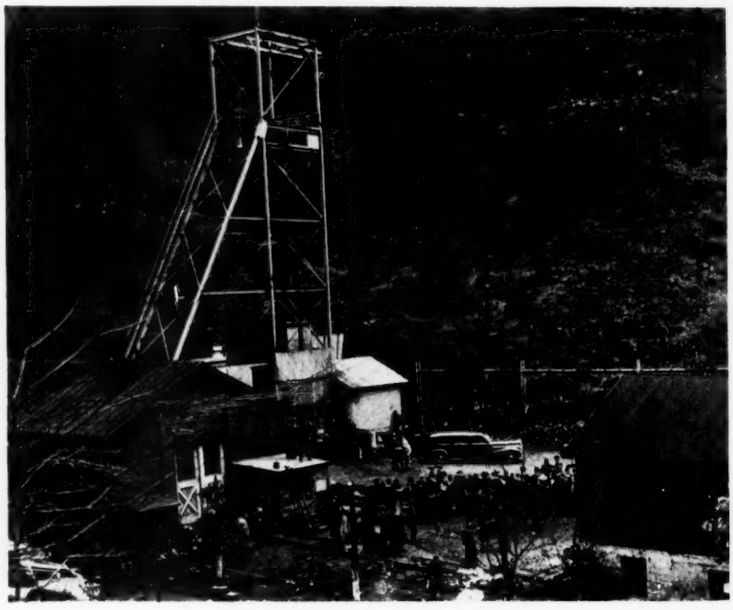
First hint of an explosion came from someone on the outside who noticed smoke over the vicinity of the fan. Word was communicated to the office near by, where, as it happened, R. E. Salvati, vice-president, from Holden, and G. J. Stollings, general manager, from Mallory, were conferring with other mine officials regarding the general safety conditions in the three mines of the company.

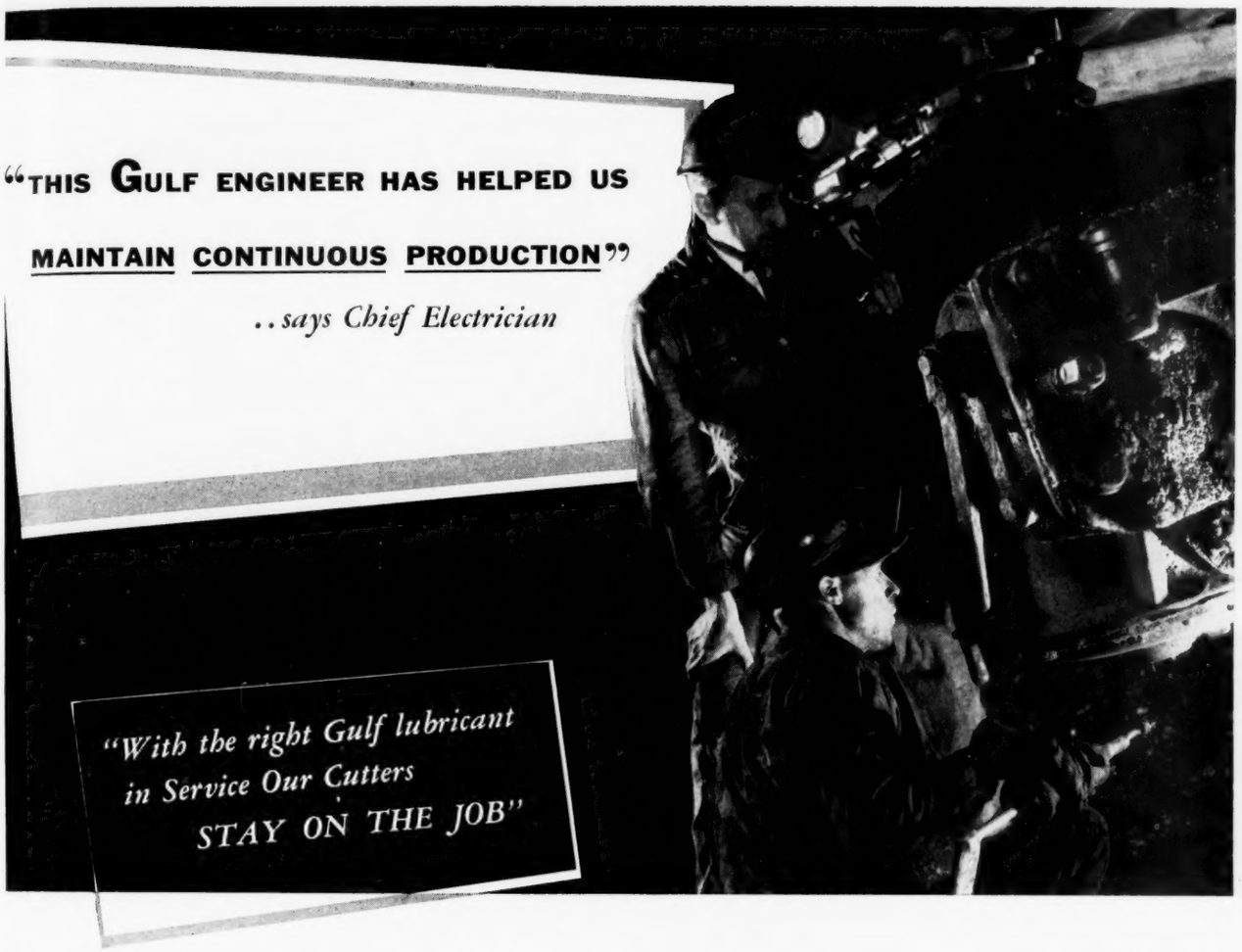
The 47 men from the unaffected section of the mine came out at the end of the shift without being aware that a catastrophe had occurred in the other section of the mine. That the two sections are not connected by mined territory is due to an area barren of coal which extends fingerlike from the boundary to a point near the shaft.

The mine is one of the most gassy opera-

View at headframe of No. 1 mine of the Pond Creek Pocahontas Coal Corporation, Bartley, W. Va., where 91 miners were killed by the explosion of Jan. 10.

Wide World





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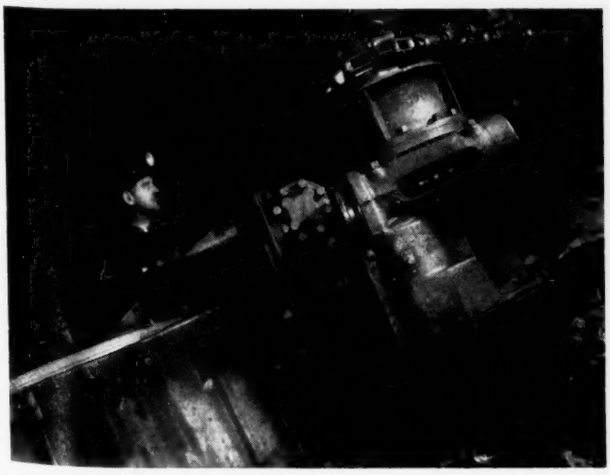

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tions in the country; therefore, from its opening in 1923, extraordinary precautions have been taken in the interest of safety (*Coal Age*, Sept. 10, 1925, p. 359). It had been operated 17 years without a major accident, At the recent rate of production of 2,800 to 3,000 tons per day, the methane emission has been over 6,000,000 cu.ft. in 24 hours. Five years ago when a new 600-hp. synchronous motor was applied to the fan the air delivery was 285,000 c.f.m. at 5.3 in. water gage and the purchased power cost to operate the fan alone was running $2,000 per month (*Coal Age*, June 1935, p. 266). An ultimate delivery figure of 300,000 c.f.m. was used in planning ice-prevention heating units for downcast shafts installed later (*Coal Age*, July 1935, p. 289). The fan exhausts through a compartment of an auxiliary shaft situated 400 ft. from the skip hoisting shaft. Shaft depths to the coal are 585 ft. About 65 per cent of the air enters through the skip shaft and 35 per cent through the man-and-supply compartment of the auxiliary shaft.

No Power Lines in Mine

This Bartley No. 1 mine is in the Pocahontas No. 4 seam, which at Bartley lies practically level and is 5½ to 6½ ft. thick. It is of a columnar, very friable nature and is low in volatile (14.90 per cent; *Coal Age*, Sept. 10, 1925, p. 359). Because of the gas encountered, the mine was opened without any power lines extending away from the shaft bottom. From the first, cutting, gathering and main haulage have been done with battery-powered units of permissible type. Expense was not spared where safety was a consideration. Included in the original layout was a 300-hp. 8-cylinder gasoline-driven emergency power-generating unit. Room-and-pillar methods have been pursued in No. 1 mine, and the recovery percentage is quite high. The company operates two other 3,000-ton mines, both in the same vicinity on Dry Fork, but these others are slope operations in the Beckley seam.

This Bartley blast was the worst mine disaster of the nation since 1928 and the worst in West Virginia since 1927. Its occurrence in a mine always known to be operated with the strictest regard for safety will naturally arouse the widest interest to discover, if possible, what was the cause of the accident and how such accidents can be prevented in the future.

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Louis F. Stoll Is Dead

Louis F. Stoll, vice-president and director of the McGraw-Hill Publishing Co., Inc., died Jan. 4 after an illness of several months, in his 51st year.

Born in Arkansas City, Kan., Mr. Stoll was graduated from St. Mary's College, Kansas, in 1909. He had been active in the publishing business since 1914, first with the Class Journal Co., publisher of *Motor Age*, *Motor World*, and *Automotive Industries*. From 1925 until his death he was associated with McGraw-Hill as vice-president in charge of the company's transportation papers, *Transit Journal*, *Bus Transportation*, and *Aviation*. For the last year, he also was in charge of the company's district office operations.

Storage-Battery Care and Rubber-Tired Haulage Engross Mining Electrical Group

SELECTION and care of storage batteries for mine haulage featured the opening monthly meeting of the year of the Illinois Mining Electrical Group, held Jan. 5 at the Masonic Temple, West Frankfort. The speaker of the evening, W. H. Burkey, Gould Storage Battery Corporation, Chicago, pointed out the definite advantage of the storage-battery locomotive in being independent of a trolley for power. The actual low cost of battery locomotives, he continued, is revealed by records showing: (1) initial cost of the battery, (2) current consumed for recharging, and (3) maintenance of both batteries and locomotives.

Mine service is the most severe test for storage batteries, so they must have mechanical strength in order to operate efficiently day after day. Plates are designed to withstand great shock or vibrations and rubber or spun-glass mats give mechanical protection to the chemicals. Such progress in battery construction and education of the operator has been made that battery life now is almost twice that of a few years ago. To assure maximum efficiency and extended life the proper selection of battery must be made, and, as the locomotive builder is in the best position to make definite recommendations, he should be consulted. Choice of the proper size battery is based on weight of cars (empty and loaded), number of cars per trip, trips per shift, length of run, grades, size of rail and type of bearings in use. Having computed the various requirements, a 25 to 35 per cent factor of safety is added to allow for the ultimate reduction in capacity caused by age.

Batteries are charged, said Mr. Burke, by a modified constant-potential system or by beginning the charge in that manner and later giving the batteries a constant-potential charge. The modified constant-potential utilizes a fixed resistance of small value in series with the battery in order to limit the starting or inrush current. Automatic regulation of charging equipment was recommended to avoid accelerated wear of the battery, and where manual regulation is necessary one man should be responsible for cutting off the charge promptly when the desired specific gravity is obtained. To avoid overheating of cells, which is detrimental to the battery life, ample time should be allowed for charging except that under certain conditions midday boosts (charging at a high rate of current for a short time) may be resorted to.

Speaker W. H. Burkey
tells about storage batteries

Clifford Goodwin and Walter Sadler
Saline County representatives fraternize

Care of batteries is a matter of common sense, Mr. Burke stated, and the general laws of cleanliness must be observed. Connectors and cells should be free of external water and acid, and the connections kept tight, being soldered or burned whenever possible. Cells should not be overcharged repeatedly or left discharged. The electrolyte and water used must be pure, and all signs of trouble should immediately be investigated and corrected. A lead battery in daily use for truck or tractor, he pointed out, needs an equalizing charge once a week, and gravity and voltage readings of each cell should be recorded every three or four months to serve as a trouble indicator. Occasionally, heavy discharges for conditioning plate material should be made, but only under supervision of a service man.

Secondary mine transportation was discussed at the December meeting of the group by A. S. Knoizen, Joy Manufacturing Co., who elaborated upon the use of shuttle cars, usually referred to as rubber-tired haulage. Emphasizing the increase in mining and handling of coal mechanically, he pointed out that heretofore the coal-mine operator has overlooked a major item in cost reduction: the application of indus-

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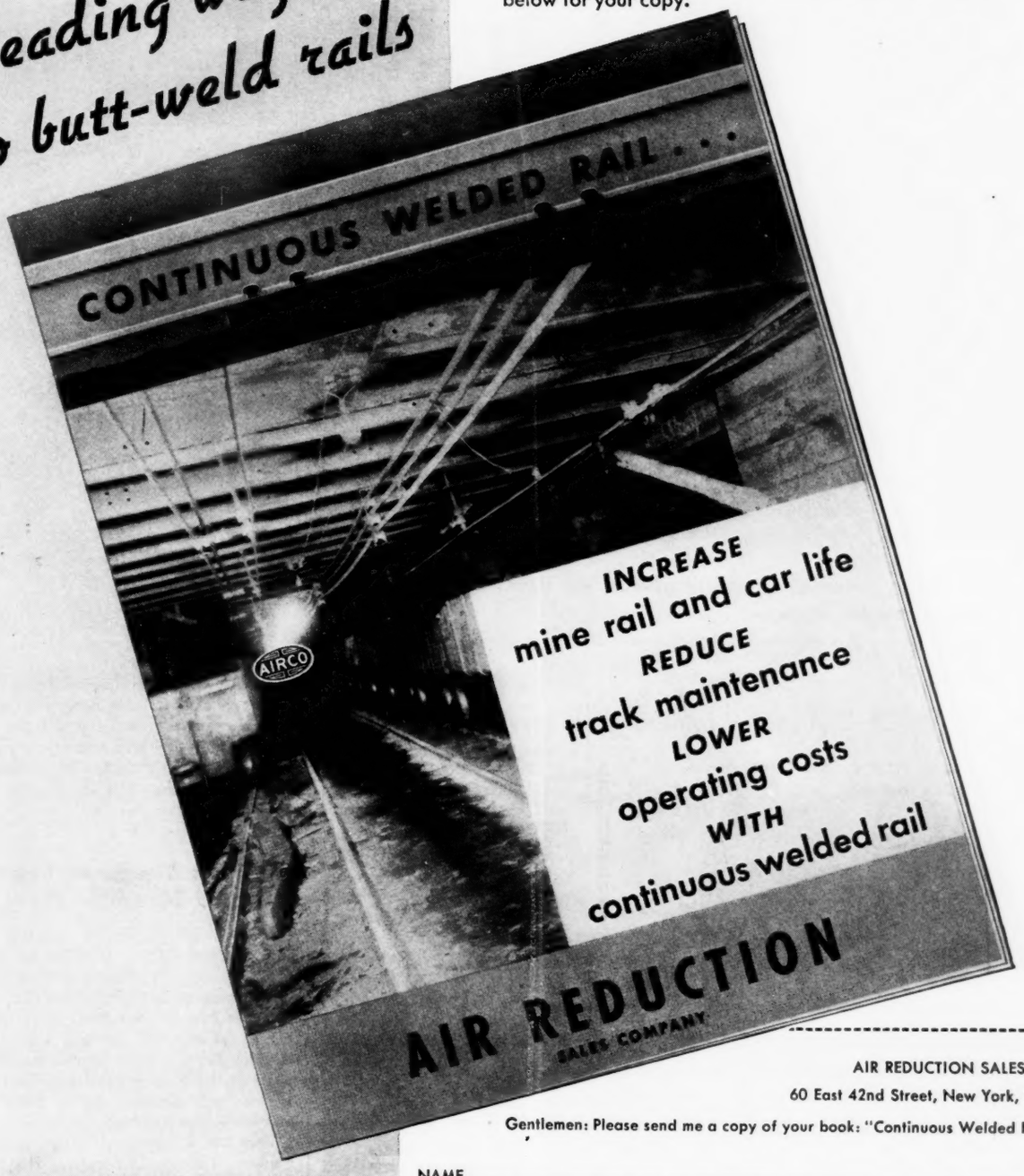
3

leading ways to butt-weld rails

Continuous welded rails in the main line track of many coal mines have successfully overcome the problems arising from the use of heavier equipment and increased loads. » » » This new Airco booklet describes in detail the three leading methods used in the butt-welding of rail: Bronze welding by the oxyacetylene process, steel welding by the oxyacetylene process, and steel welding by the metallic arc welding method. Mail the coupon below for your copy.



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President C. C. Conway
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trial engineering to coal mining. Savings other than those inherent in the machines themselves are available and secondary transportation at present offers the greatest opportunity for cost reduction. It must be remembered, though, he warned, that haulage improvements are not a cure-all for every coal-mine ailment.

Moving pictures of shuttle cars in actual operation displayed by Mr. Knoizen showed various conditions encountered at several different operations. He stated that shuttle cars were successfully operating in 36- to 38-in. coal, but in such cases the floor must be relatively smooth or difficulty may result from the ends of the car striking the roof. It has been determined through experience, he continued, that the most favorable operating speeds are 6 m.p.h. empty and 4 m.p.h. loaded and the limit for local grades should be 12 per cent. Tire life at present is unpredictable, but, he pointed out, in nineteen months of service only two failures have occurred except where external damage was inflicted. The same battery-life guarantee is given as for locomotive service and experiments with smaller batteries with a change at noon are being made.

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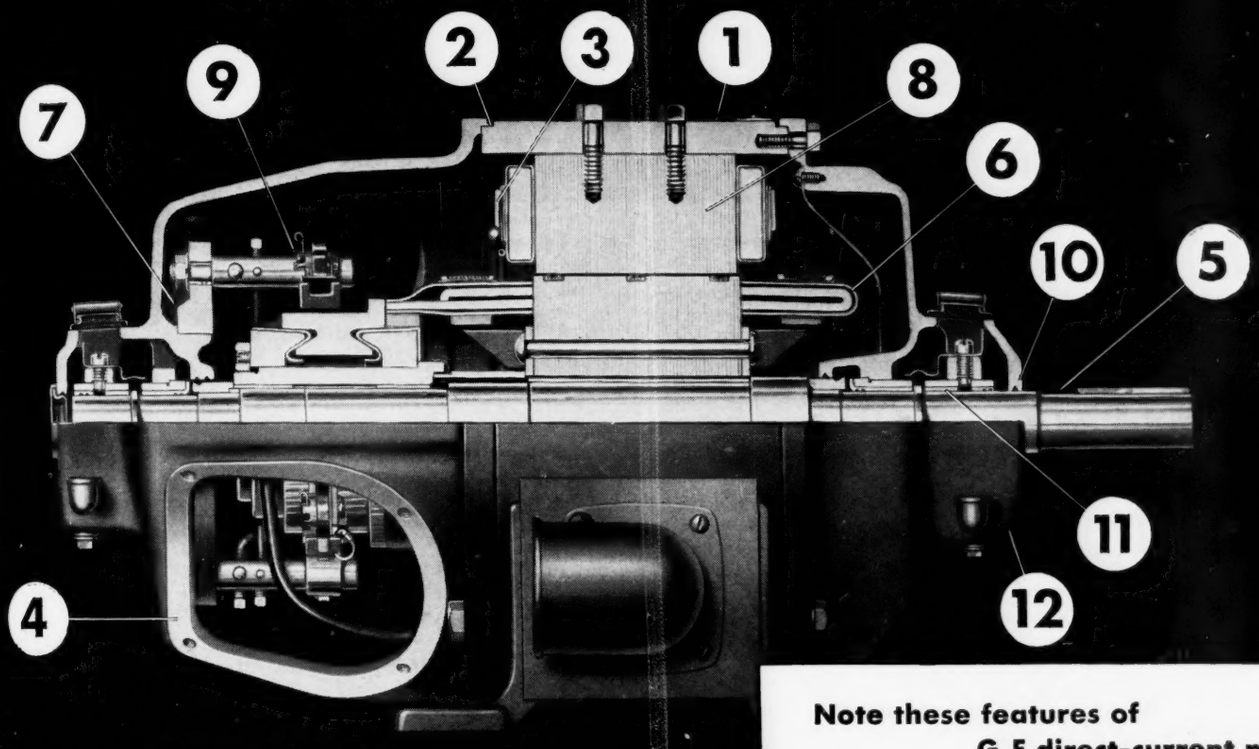
Finch Resigns as Director Of Bureau of Mines

John Wellington Finch resigned on Jan. 2 as director of the U. S. Bureau of Mines to resume practice as a mining engineer. His retirement is effective Jan. 31. He was appointed to succeed Scott Turner as head of the government bureau Aug. 16, 1934. At the time of his appointment he was dean of the School of Mines, University of Idaho, and director, Idaho State Bureau of Mines and Geology.

Born at Lebanon, N. Y., in 1873, he attended Colgate University. His technical experience includes the following positions: geologist, Rock Island R.R., Oklahoma and Texas; Colorado State geologist, 1901-6; consulting engineer, mining geologist and manager of mining companies in the Eastern and Western States, Canada, Mexico,

INSIDE FACTS

Why G-E direct-current motors give long, low-cost service in coal mines



Cutaway view of a G-E direct-current motor

SEE for yourself that there's no mystery about the ability of G-E direct-current motors to give excellent performance in coal mines.

No mystery—just facts; facts about their design and construction that show why they can be relied upon to give years of dependable, low-cost service wherever they're installed. Take a minute to check these facts for yourself, remembering that because of space limitations they form only a partial list.

Long bearing life, excellent commutation, a highly protective insulation with remarkable bonding qualities, easily accessible brush rigging, a convenient lubrication system—you find all these advantages in G-E d-c motors.

Remember this, particularly—these motors can be furnished with steel plates over the end shields to protect against dripping water or falling particles of solid matter. Perforation of the bottom plates assures effective ventilation. Thus, you get a real mining motor available in a wide variety of standard ratings, speeds, and enclosures. Our nearest representative will be glad to give you complete details. General Electric, Schenectady, N. Y.

Note these features of G-E direct-current motors:

1. Rolled-steel frame, bored throughout its length, assures uniform air gap and maximum strength.

2. Substantial, 360-degree rabbet fit maintains accurate concentricity and alignment of end shields.

3. Series windings outside shunt, resulting in a better-insulated coil. G-E bonding varnish cements the coils into a solid mass. High resistance to foreign matter prolongs the life of the winding.

4. End-shield openings can be covered with flat plates or screen covers, for which tapped holes are provided.

5. Shaft readily removable.

6. Form-wound, pretreated coils.

7. Brush yoke clamped in position and easily adjustable.

8. High-grade silicon-steel laminations.

9. Brush holders easily adjusted to maintain proper setting.

10. Grease-filled V-grooves exclude dust and dirt.

11. Steel-shell, babbitted bearing linings.

12. Large oil reservoir.

GENERAL ELECTRIC

008-50

Permissible Plates Issued

Two approvals of permissible equipment were issued by the U. S. Bureau of Mines in December, as follows:

Chicago Pneumatic Tool Co.: No. 571 hand-held drill; 2-hp. motor, 220 volts, a.c.; Approval 387; Dec. 5.

Goodman Manufacturing Co.: Type G-15-B-82 shaker conveyor; 15-hp. motor, 230 volts, d.c.; Approval 388; Dec. 19.

South Africa, China, Siberia, Siam, Burma and other Asiatic countries; industrial adviser to the Yunnan Province Government, China, 1920-24; and, at various times over twenty years, Department of Justice expert in the investigation of frauds in the sale of mining stock. Dr. Finch was instructor at Colgate University, 1898; University of Chicago, 1899; lecturer on mining, University of Chicago, 1912; professor of mining geology, Colorado School of Mines, 1925-9, after which he joined the Idaho School of Mines.

Secretary of the Interior Ickes stated Jan. 4 that he had dismissed Dr. Finch because he felt that the latter "wasn't running the Bureau. A little group was running it, and I don't happen to like that kind of an organization. There has been a little bureaucratic clique in the Bureau that resents any suggestion from a superior officer. They have run the Bureau since President Hoover's time." He characterized Dr. Finch as a "fine scientist, scholar and gentleman," but without enough "iron in his blood" to run his own bureau.

John D. Battle, executive secretary, National Coal Association, made the following comment:

"Press reports of a prospective 'purge' of the Bureau of Mines by the Secretary of the Interior in which the forced resignation of Dr. Finch is allegedly the first step, attribute it to lack of enthusiasm by Bureau officials for the federal mine inspection bill, S. 2420, promoted by the United Mine Workers and now pending in Congress.

"The disinclination of Bureau of Mines officials to swallow this proposed measure is readily understandable. The bill masquerades as promotive of mine safety and accident prevention, but in reality disrupts the existing federal mine-safety service, seeks to supersede State mine-safety services, and seeks to bring mine management under federal bureaucratic control, all at new cost of unlimited amount upon the federal treasury. No one except representatives of the United Mine Workers has as yet come forward to publicly defend the mislabeled safety measure. It has been opposed by State mining departments and other State officials and by many public organizations as well as by the mine operators throughout the industry.

"The reputed enthusiasm of the Secretary of the Interior for a bill which would place additional bureaucratic power in his hands is not surprising. The promotion of this measure by the United Mine Workers doubtless rests upon their expectation that the new bureaucratic power, if created, will be exerted at their behest and in their favor. But disruption of the Bureau of Mines and purge of its personnel on this account, if such transpires, is infamous."

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Coal Hearing Nears Seventh Month With End in Sight

WASHINGTON, D. C., Jan. 20—As final price hearings before the Bituminous Coal Division are about to enter their seventh month the end is in sight. Evidence on producers' protests was completed and presentation of affirmative evidence by consumers began on Jan. 9, being finished three days later. Then came testimony by the Consumers' Counsel Division, to be followed by rebuttal, with the district boards to be heard in numerical order.

Secretary of the Interior Ickes said the hearing was "moving fast" and that he would give coal prices the right of way. He also announced that the Coal Division would be under the administration of the new Under Secretary, Dr. Wirtz.

Director Gray of the Coal Division denied on Jan. 18 a motion by 27 producers, consumers and chambers of commerce to extend the time for filing of briefs and exceptions to findings to six months after close of the hearing. The director allowed 25 days. Counsel for the Carter Coal Co. contended the additional time was required for study of the voluminous records of hearings carried on since last spring.

The ruling of the federal three-judge Statutory Court of the Eastern District of Arkansas, at Little Rock, during the second week in January clears the way for an early decision on the constitutionality of the Bituminous Coal Act, Director Gray announced Jan. 17. The decision upheld an important point of legal procedure by declaring that the correctness of the Division's orders could be questioned only in the U. S. courts of appeals under the coal act and not in the district courts.

The court dismissed the Sunshine Anthracite Coal Co.'s claim that its coal is not bituminous, on the ground that the question had been conclusively settled in an earlier proceeding and that, in any event, it had no jurisdiction to review the Coal Commission's order. The court indicated that it would now give attention to the question of the coal act's constitutionality.

The Sunshine company, of Russellville, Ark., an affiliate of the Binkley Coal Co., Chicago, sought to enjoin the Bureau of Internal Revenue from collecting the 19½ per cent tax imposed by the coal act on bituminous-coal producers who do not join the coal code. The company, which is not a code member, alleged in its suit that it does not produce bituminous coal and that the coal act is unconstitutional. A determination by the old Coal Commission that the coal produced by the company was bituminous within the meaning of the act was affirmed by the Circuit Court of Appeals for the Eighth Circuit, and the Supreme Court of the United States refused to review the decision of that court.

In a brief filed Jan. 4, the Consumers' Counsel Division attacked proposals of the American Coal Distributors' Association

which, it contends, would add $5,400,000 annually to the coal bill of consumers by permitting an average discount of 18c. a ton to coal distributors by producers. Although the Consumers' Counsel Division feels that, with an adjustment to eliminate any profits in the proposed discounts, the schedule of discounts proposed by the Coal Division is generally supported by the evidence adduced at the recent hearing on discounts, it takes exception to the discounts proposed for railroad fuel. The brief states that purchase of bituminous coal for resale to on-line railroads constitutes little more than reciprocity arrangements between the carriers and coal producers, the roads making purchases in proportion to the freight tonnages of the mines they serve.

W. M. Richardson, president, National Portland Cement Co., warned the Coal Division that the fixing of bituminous prices may work severe hardships, particularly on the wage earner, in an already hard-hit industry. "The results of price fixing, particularly at a high rate," he said, "may conceivably force the cement industry to substitute some other material for coal. Certain cement plants in the country which are being rehabilitated are withholding installation of their heating equipment until their engineers have concluded whether it will be more economical to install a system using high-volatile slack or substitute fuel. An increase of 75c. a ton on bituminous slack, as proposed by the Coal Division, may settle their minds in favor of substitute fuel."

Half of the Coal Division's field offices are to be closed and their functions transferred to other offices on Jan. 31. Thirteen of the 97 employees affected by the order will be transferred and the remainder dismissed, effecting an annual saving of $180,000, according to Director Gray. The offices to be eliminated are: Saginaw, Mich., work transferred to Cleveland (Ohio) office; Wheeling, W. Va., transferred to Fairmont; Louisville, Ky., transferred to Indianapolis, Ind.; Des Moines, Iowa, and Fort Smith, Ark., transferred to Kansas City, Mo.; District 16 office at Denver Colo.; Santa Fe (N. M.), Cheyenne (Wyo.), Salt Lake City (Utah), Billings (Mont.) and Tacoma (Wash.) offices, merged with District 17 office at Denver.

Provisional approval as a regional marketing agency has been granted to Belleville Fuels, Inc., Chicago, which proposes to sell the coal mined by six individual producers in the Belleville and DuQuoin (Ill.) districts. Members of the agency are: St. Louis & O'Fallon Coal Co., Pyramid Coal Corporation, Southwestern Illinois Coal Corporation, United Electric Coal Cos., Union Colliery Co. and Truax-Traer Coal Co.

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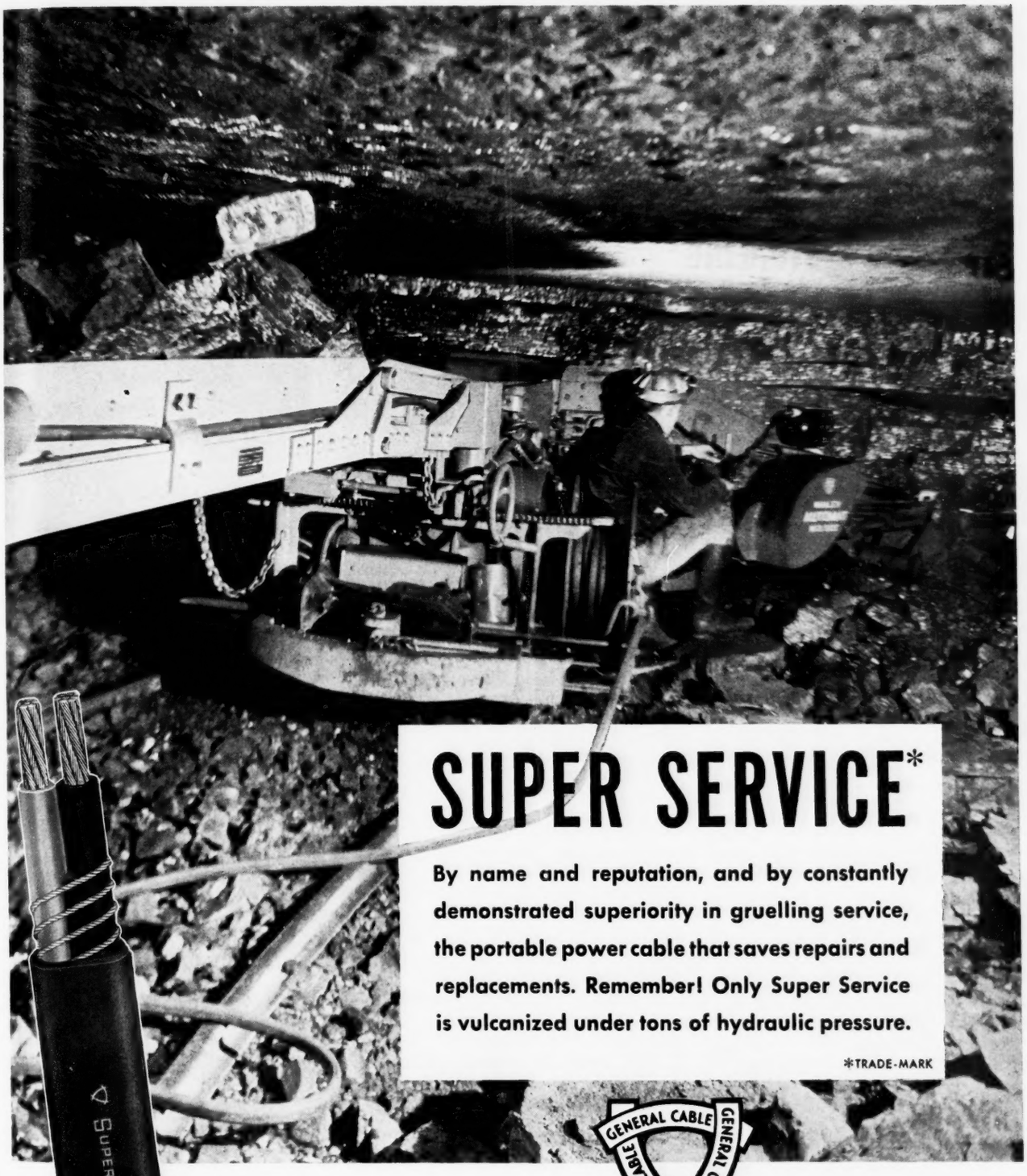
New Dust Allayer Launched

The Dow Chemical Co. and the Johnson-March Corporation have united in the manufacture and sale of Coaladd, a new product in the dust-elimination field. A Johnson-March development, Coaladd is a new form of Coalaid, from which there is no perceptible difference in effectiveness.



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Coaladd, however, is in the form of dry granules, packed in 100-lb. paper sacks, whereas Coalaid is sold in liquid form in tank-car lots only. The newer product is mixed with water and sprayed on the coal.

Dow is both manufacturer and national distributor of the new Johnson-March product. The latter firm, however, has reserved for itself all sales to coal mines and all sales in the metropolitan district of New York, while Dow has sales rights to yards, docks, and storage plants everywhere else.

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West Virginia Coal Conference To Be Held in October

The 1940 renewal of the annual West Virginia Coal Conference has been set for Oct. 18 and 19 at Morgantown, according to an announcement by W. E. E. Koepler, secretary of the Pocahontas Operators' Association and chairman of the conference program committee. This will be the fourth annual conference, and, as has been the case since the inaugural gathering, in 1937, West Virginia University again will be the host.

Mr. Koepler, who made the announcement while in Morgantown to confer with President Charles E. Lawall of the university, said another attractive program is being prepared. Outstanding men in various phases of the coal-mining industry will address the assemblage.

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Personal Notes

ALEXANDER BONNYMAN, president, Blue Diamond Coal Co., Knoxville, Tenn., has been made a life member of the American Society of Civil Engineers, of which he has been a member since 1908. Albert S. Fry, president of the Tennessee Valley Section, A.S.C.E., presented the certificate of life membership on Jan. 10 at Knoxville.

HARRY J. CONNOLLY, vice-president, Pennsylvania Coal Co. and Pittston Co., Scranton, Pa., has been elected president of those companies as well as of the Northwestern Mining & Exchange Co., DuBois, Pa., vice L. L. White, resigned.

THOMAS COOKE, foreman at No. 1 slope of No. 7 colliery, Susquehanna Collieries Co., Nanticoke, Pa., resigned Dec. 30 after 49 years of uninterrupted service with the company. He left to accept a berth at the Luzerne County court house.

W. J. CUNNINGHAM, president, Crummies Creek Coal Co., Crummies, Ky., has been reelected president of the Harlan Coal Operators' Association. Other officers renamed are: vice-president, R. E. LAWSON, general manager, Cornett-Lewis Coal Co.; secretary, GEORGE S. WARD.

H. N. EAVENSON, president, Clover Splint Coal Co., has been elected president of Bituminous Coal Research, Inc. Vice-presidents are L. W. HOUSEHOLDER, vice-president. Rochester & Pittsburgh Coal Co.; R. H. SHERWOOD, president, Central Indiana Coal Co., and JAMES W. CARTER, president, Carter Coal Co.; treasurer, M. L. GARVEY, Pocahontas Fuel Co.; secretary, C. A. REED; assistant secretary-treasurer, J. F. HANLEY.

Walter H. Glasgow

WALTER H. GLASGOW, former official of the H. C. Frick Coke Co. and Secretary of the Pennsylvania Department of Mines at Harrisburg during both the Pinchot and Fisher administrations, has been named general sales manager for L. M. Brown, Inc., Homestead, Pa. This firm, which is affiliated with the Crucible Electric Steel Corporation, recently perfected a new self-hardening steel mining-machine bit for cutting coal.

P. C. GRANEY resigned Dec. 26 as general manager of the CCB division of the Koppers Coal Co., with offices at Mount Hope, W. Va. After more than ten years at the head of the division Mr. Graney will devote his time to private interests in banking, coal mining and petroleum distribution.

CLARENCE G. GREAVES, formerly sales manager at Baltimore for the Pittsburgh Coal Co., has been appointed assistant sales manager, with headquarters in New York City. WILLIAM W. EVERSMANN succeeds him as sales agent for the Baltimore district, with headquarters in Philadelphia.

CARL F. KECK has resigned his position of safety engineer with the Jamison Coal & Coke Co., Greensburg, Pa., to become superintendent of the Koppers Coal Co.'s Keystone mine, Keystone, W. Va.

C. J. MACDONALD, electrical engineer for the Weirton Coal Co., Isabella, Pa., has resigned that post and accepted a similar position with the Hanna Coal Co., St. Clairsville, Ohio.

GEORGE N. MCLELLAN, formerly safety engineer for the Weirton Coal Co., Weirton, W. Va., has been appointed superintendent of the Isabella mine of the company, Isabella, Pa.

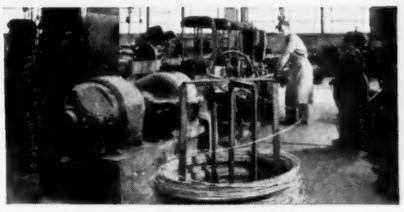
MARSHALL S. MORGAN, president, Fidelity-Philadelphia Trust Co., has been elected to the board of managers of the Lehigh Coal & Navigation Co., Philadelphia, Pa.

GEORGE H. MORSE, vice-president, Union Collieries Co., was elected president of the Coal Operators' Association of the Thick Vein Freeport Seam of Pennsylvania at its

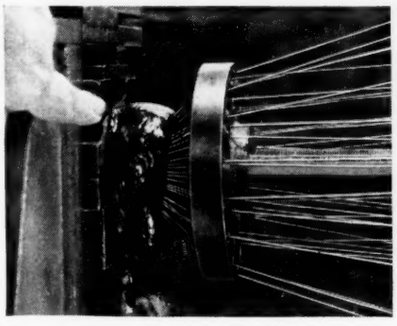
"Sure I Can Prove Wire Ropes Are NOT All Alike! Look . . ."

Macwhyte Salesman: It's true, Mr. Buyer, that wire ropes LOOK alike. But you don't buy LOOKS, you want PERFORMANCE. So let me take you behind the scenes and find out what performance is made of . . .

Mac: *You'll find, in making steel,* few companies use exactly the same kind of ore, or the same method of smelting. In heat treating (above) and in baking, temperatures vary, too. From the very beginning wire ropes are made differently. Then . . .



Mac: *You'll discover also that few manufacturers have exactly the same specifications for making wire ropes.* Few use identical dies for wire drawing (above), probably none of them use the exact number of drafts . . .



Mac: *You'll learn that the way a rope is "closed" and lubricated* (above) makes a lot of difference in performance. Few companies use the same procedures, or the same lubrication . . .

Mac: So, from just a few operations, you can see why wire ropes actually are very different. After years of experience and laboratory research we've produced our own formula for making better wire rope. Ask any user . . . he'll tell you Macwhyte gives performance second to none.

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1 Laboratory tested, field proved wire rope . . . made from the finest steels, made for the specific job. Field proved on countless jobs.

2 PREformed . . . to give you much longer service, and lower your wire rope costs.

3 With THE Internal Lubrication . . . a special Macwhyte lubricant that covers EVERY WIRE and strand, gives REAL protection where it's needed most: against internal friction and corrosion.

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MACWHYTE COMPANY, Kenosha, Wis. Manufacturers of Wire Ropes and Braided Wire Rope Slings for every use. (Distributors throughout the U. S. A.) New York . . . Pittsburgh . . . Chicago . . . Ft. Worth . . . Portland . . . Seattle . . . San Francisco

GENERAL CATALOG listing over 1000 ropes with information on ordering, care, and the use of wire rope, available on request.

PLUS INTERNAL LUBRICATION

annual meeting on Jan. 11. Other officers named are: vice-president, W. P. VANCE, general superintendent, Butler Consolidated Coal Co.; secretary, C. W. GIBBS, general manager, Harwick Coal & Coke Co.; treasurer, GEORGE C. TREVORROW, mining engineer, Harwick Coal & Coke Co.

G. M. SAMPLES has been made mine foreman at Carbon No. 3 mine of the Carbon Fuel Co., Carbon, W. Va.

FRED SCHLEIFER, traffic manager, Franklin County Coal Corporation, Chicago, has been elected general chairman of the Midwest Shippers' Advisory Board. He was previously chairman of the coal and coke committee of the board.

W. F. SCHULTEN has been appointed to the newly created position of general traffic manager of the Pittsburgh Coal Co. and subsidiaries, Pittsburgh, Pa. He has served as traffic consultant for the Illinois Steel Co., Universal Portland Cement Co., and as vice-president of Chicago district, Electric Generating Corporation and Super Power Co. of Northern Illinois, and as representative of a group of 150 utility companies on traffic and rate problems. W. P. BUFFINGTON, traffic manager, will continue his present duties.

LYNN L. WHITE has resigned as president of the Pennsylvania Coal Co. and Pittston Co., Scranton, Pa., and the Northwestern Mining & Exchange Co., DuBois, Pa., to become operating vice-president of the Chicago & North-Western Ry. Co.

L. F. WEICHEL has been engaged as general manager of the Cranberry Improvement Co.'s Cranberry colliery, Hazleton, Pa., vice G. HENRY ALTMILLER. Mr. Weichel has been general manager for the last four years of the Monarch Anthracite Mining Co., West End Coal Co. and the Price-Pancoast Coal Co. Previous to that he was general superintendent of the Northern Division of the Hudson Coal Co.

E. H. WOODS, formerly manager of the Louisville (Ky.) sales office of the Southern Coal Co. and for about two years sales manager at Chicago for the Columbus Mining Co., has returned to Louisville as sales manager for the Black Star Coal Corporation, Dixie Star Coal Co., Pioneer Coal Corporation and Paradise Mining Co., all of which are interests of W. S. Speed and former U. S. Senator F. M. Sackett.

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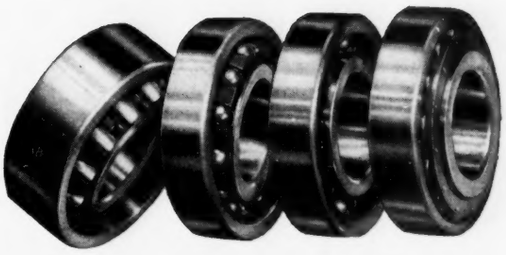
Obituary

A. P. KING, 74, director and former president of the United Coal & Dock Co., Milwaukee, Wis., died Jan. 7 in Mercy Hospital, Brownsville, Texas, following a stroke. He was associated with the old Wisconsin Coal & Dock Co. until the formation of the United Coal & Dock Co. in 1919. He became president of the latter in 1925 and chairman of the board in 1934. He retired in 1936 but remained a director.

WILLIAM C. HOOD, 62, general superintendent for the H. C. Frick Coke Co., Scottsdale, Pa., a subsidiary of the United States Steel Corporation, died Jan. 22 at Uniontown Hospital from a complication of diseases

G.E. AND SKF



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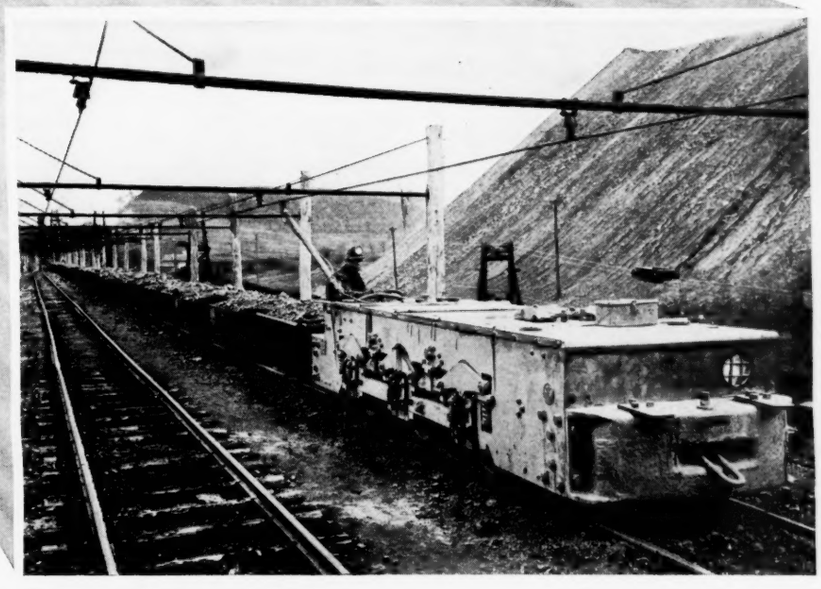

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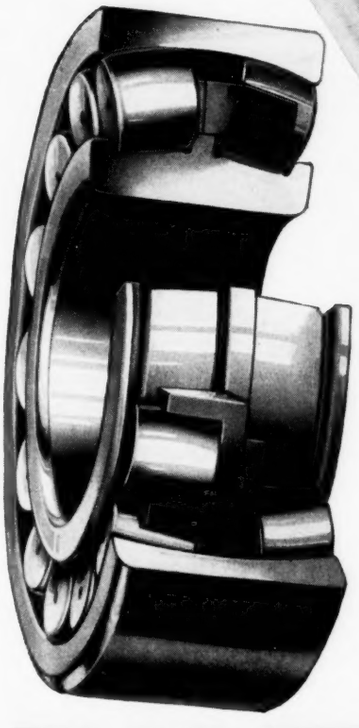

Hauling coal cars from working face to main entry—pounding, jarring, and bumping—is tough going for mine locomotives, but it's not too tough for SKF Bearings on the motors. With SKF Bearings, nobody needs to worry over interruptions to replace worn bearings or damaged armatures . . . or over the high cost of breakdowns and shutdowns.

Growing old gracefully, SKF Bearings keep armatures in correct position throughout the life of the locomotive. Dust and grit are effectively excluded by sealed housings. Lubricant leakage with consequent motor troubles is an unknown factor. And as a result, motors require inspection and lubricant replenishment only three or four times a year. In a district office near you is a man who will be only too glad to help *you* solve your bearing problems. Give him a ring before you turn this page.

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SKF INDUSTRIES, INC., FRONT ST. & ERIE AVE., PHILA., PA.

William C. Hood

after a four months' illness. He started his career with Frick in 1897 as a shipping clerk. From 1917 to 1938 he was assistant general superintendent, in the latter year becoming general superintendent for the United States Fuel Co., another Steel Corporation subsidiary, at Gary, W. Va. He returned to the Frick company as general superintendent Jan. 5, 1939.

JAMES L. DEEGAN, 68, president of the Massillon-Tuscarawas Coal Co., Cleveland, Ohio, and active in other lines, died Jan. 4. He entered the coal industry as a young man with the Goff-Kirby Co. and rose to head the firm, serving as president twenty years. He resigned in 1927 to organize his own company.

J. GREY EMMONS, president, Big Bend Coal Mining Co. as well as the Emmons Coal Mining Co., sales division, with an operation at Twin Rocks, Pa., and offices in Philadelphia, died Jan. 9.

•

U.M.W. Upheld as Bargaining Agent In Anthracite Region

Ruling, in effect, that the approximately 115,000 miners employed by 202 Pennsylvania anthracite operators constituted a single appropriate unit for collective bargaining, the National Labor Relations Board on Jan. 7 certified the United Mine Workers as agent for the men. The board's action was in connection with the petition of the Progressive Mine Workers for certification as collective bargaining agency to represent employees of the Stevens and Alden coal companies, which was opposed by the U.M.W.

In announcing its decision the board concluded: "We are convinced that the full benefit of their right to self-organization and to collective bargaining cannot be insured to the employees by breaking up the collective-bargaining unit which has been established by a long history of contractual relations between the operators and miners of the anthracite region. We find that the single unit urged by the Progressive is not appropriate for the purposes of collective bargaining. We shall therefore dismiss the petitions of the Progressive."

$200,000 Lincoln Awards For Industrial Progress

A 2½-year program of scientific study, as a result of which $200,000 in awards will be paid, is announced by the James F. Lincoln Arc Welding Foundation, Cleveland, Ohio. The 458 awards are established for studies bringing out benefits of a social, economic or commercial nature, such as reduction or elimination of hazards to safety and health, greater availability of comforts and conveniences through reduced prices, greater utility and durability of machines and structures, as well as industrial benefits such as cost savings and other advantages in manufacture, fabrication or construction.

Studies encouraged with a view to creating such large-scale benefits will concern machines, products and structures of all types. Awards ranging from $13,700 to $100 will be made in 12 classifications and 46 divisions into which the industrial field has been divided for purposes of participation. Inquiries concerning the program should be addressed to the secretary of the foundation.

•

Boyles Heads Technical Group In St. Louis Smoke Study

R. M. Boyles was selected as chairman of the newly created special smoke committee of the Joint Council of Associated Engineering Societies of St. Louis at the first meeting of the group, Dec. 27, at the Mayfair Hotel. The committee, composed of twelve engineers, was formed at the request of Mayor Dickmann to review accomplishments under the present smoke ordinance and make suggestions for ultimate solution of the smoke problem.

Mr. Boyles, H. E. Wiedemann and W. C. B. Sodemann were designated by the group as its representatives to meet with the Mayor's general smoke elimination committee. Through them the engineers' group will supply the general committee with any information of a technical character requested by the latter group. In addition, the engineers will study the smoke problem and report its own conclusions on how to attack the evil. Care will be taken to avoid duplication in the work of the two committees, said Mr. Boyles.

The three members of the committee that represent the American Institute of Chemical Engineers will study, among other things, fuels and the means of processing soft coal to make it burn smokelessly. Activities of the three representatives of the American Society of Mechanical Engineers and the American Society of Heating and Ventilating Engineers will be along the line of investigating heating devices and mechanical combustion equipment.

The Washington University School of Engineering will make tests of various smokeless fuels for the smoke elimination committee, according to James L. Ford, Jr., chairman of the committee. The tests will be directed by Dean Alexander Langsdorf of the engineering school. The purpose of the tests is to see how foolproof the smokeless fuels are. He pointed out that almost any fuel can be burned smokelessly if

furnaces are fired properly, but that not all fuels burn well in stoves.

Alderman Joseph B. Schweppe introduced in the Board of Aldermen late in December a bill which, in effect, would prohibit use of Illinois coal in St. Louis heating plants without mechanical firing equipment after Jan. 1, 1942. The measure forbids "importation, sale and consumption of solid fuel containing more than 20 per cent volatile matter in any heating plant of the surface-burning type." Mr. Schweppe said his bill would prohibit use of Illinois coal in non-stoker furnaces because it contains more than 20 per cent of volatile matter, which produces smoke and fly ash.

The city smoke-regulation ordinance was upheld by Circuit Judge Ernest F. Oakley late in December in decisions affecting five pending cases. In this, the first, court ruling on the ordinance, the court affirmed the city's power to seal boilers of business establishments which fail to observe the regulations through use of smoke-producing fuel or lack of smoke-prevention devices. "This court takes judicial notice," said Judge Oakley, "that dense smoke is a public nuisance and is injurious to health and property, and that there are several known devices for the regulation of this smoke."

The court held that in enacting the smoke ordinance the city was making a proper exercise of the police power; that the ordinance is not broader than the authorizing statutes of the State, and that it is not contrary to the due process of law provisions of the Federal and State constitutions.

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A.I.M.E. Coal Division Meeting Lists Interesting Papers

Preparation, costs, packaged fuel, fan performance and stoker combustion are among the subjects to be considered at the annual meeting of the Coal Division of the American Institute of Mining and Metallurgical Engineers, to be held Feb. 12–15 at the Engineering Societies Building, New York City. Papers to be presented include: "Ducts for Preparation Plants," John Kane, American Air Filter Co.; "Production of Low-Temperature Coke by the Disco Process," C. E. Lesher, president, Pittsburgh Coal Carbonization Co.; "Longwalling on Timber in Alabama Coal Mines," L. I. Cothern, Virginia Polytechnic Institute; "Performance and Equipment Cost in Shaker Conveyor Mining of Anthracite," John S. Marshall, mining engineer; "Flushing Methods at 'Driving Park' Section of Scranton, Pa.," F. D. Shoemaker, Penn Anthracite Collieries Co.; "Launder and Table Washing of Fine Coal," J. T. Crawford, Pittsburgh Coal Co. of Wisconsin, and C. P. Proctor and J. A. Younkins, Pittsburgh Coal Co.; "Rate of Free Fall of Anthracite Particles," H. J. Rose, Mellon Institute of Industrial Research, and F. P. Lasseter; "Development of the Packaged-Fuel Industry," Ray F. Mitten, C. M. Eberling Co.; "Effect of Underground-Stopping Leakage Upon Mine-Fan Performance," Raymond Mancha, Jeffrey Mfg. Co.; "Proportions of Free Fusible Material in Coal Ash as an Index of Clinker and Slag Formation," G. B. Gould and H. L. Brunjes, Fuel Engineering Co. of New York; "Studies in the Correlation of Domestic-Stoker Combustion with Laboratory Tests and Types of Fuel," L. C. McCabe, Illinois Geological Survey; Mr. Konzo and O. W. Rees; "Fundamental Concepts Pertaining to the Swelling Pressure of Coal," W. Fuchs; "Development and Application of Artificial Mine-Roof Support Used in Anthracite Region of Pennsylvania," W. W. Wirth and W. L. Dennen.

The section on Health and Safety in Mines had the assistance and advice of D. Harrington, U. S. Bureau of Mines, as to papers on safety subjects and of R. R. Sayers, U. S. Public Health Service, as to health. Among the papers to be presented are these: "Some Hints on Safety in the Use of Explosives in Coal Mining," B. L. Lubelsky, consulting engineer; "Explosion-Fire Outline in Connection with Coal Mining," C. J. Flippen; "Testing of Respiratory Equipment," H. H. Schrenk.

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Smokeless Fuel From Stoker Dust To Be Produced by C. W. & F.

The smoke nuisance is only one of the problems facing the coal industry of the Middle West. The waste of coal in itself, whether it be in the sludge from a washer or the dust from a dedusting plant, is a major loss to an industry already hard pressed to show a profit. Practically every coal-producing property that invests in an elaborate cleaning plant has these losses of very fine coal in one form or the other. When it is realized that 3 or 4 per cent of the purest coal is lost in this way, the seriousness of this waste is apparent.

For several years the Chicago, Wilmington & Franklin Coal Co. has been building up an increasing business in dedusted stoker coal. The demand has made it necessary to crush more and more of larger sizes to meet market requirements, until the quantity of hitherto unmarketable dust now runs to 600 or 700 tons per working day from its two Orient mines, in Franklin County, Illinois. This dust contains little of impurities because impurities do not float off readily and, therefore, it analyzes better than mine-run coal. In this coal there also is considerable fusain—mineral charcoal—which is free of volatile matter. Looking to the recovery of this high-grade coal, experiments in low-temperature carbonization are in progress.

George W. Wallace, who has spent the last several years on coal-research work in England, producing smokeless fuel, is in charge of these experiments at the New Orient mine. The essence of the process is: Thin layers of coal dust are preheated, then transferred to a close oven for 1½ to 2 hours at a temperature of 550 deg. C. Coal to a depth of 2½ in. is spread in shallow covered metal pans and heated for about 90 minutes. This reduces the volatile content from about 30 to around 10 per cent and leaves a solid cake of coke with irregular fissures along which it readily breaks. This brings the product well within the 20-per-cent volatile line, below which a fuel is recognized as smokeless. Normal Orient coal runs about 35 per cent volatile.

The weight of the coke is about 70 per

cent of that of the coal used. It runs about 8 per cent ash, but does not clinker. There is a byproduct of 12 to 15 gal. of tar oil per ton, which runs high in desirable chemical compounds. Its 10 per cent volatile makes it easy to kindle as compared to high-temperature coke with practically no volatile. It is said to be entirely suitable for use in hand-fired stoves and furnaces. The fact that coal dust is purer than the coal it comes from accounts to a large degree for the excellent and attractive characteristics of the product.

It is believed the results obtained to date will justify commercial-scale operation, with this threefold advantage: Supplying a critical market with a smokeless fuel suitable for hand-firing, helping an essential industry to live, and a step toward the conservation of our national fuel resources.

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Superior Mine Dispute Settled: Long Shutdown Ended

The controversy between the Superior Coal Co., Gillespie, Ill., and Progressive Mine Workers which kept three Superior mines closed for nearly two months (*Coal Age*, January, p. 74) was settled Jan. 6 with acceptance of a company proposal by local union No. 1, P.M.W. The three mines, located at Wilsonville, Mount Clare and Sawyerville, were to open as soon as possible, according to D. D. Wilcox, general superintendent.

About 1,500 miners became idle Nov. 17 following closing of the mines and discharge of 93 miners accused of slowing down production in protest against refusal of the company to place in operation a share-the-work program for all workers.

The accepted company proposal, according to Kenneth Donaldson, local union secretary, included these points: (a) That the 93 haulage men who were discharged be returned to work; (b) the miners agree that the company shall have the capacity of loading machines, as provided in the contract; (c) that all disputes and grievances be handled according to the contract.

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Multiple-Drive Ratings Revised By V-Belt Industry

Based on studies of belt life made by engineers of Allis-Chalmers Mfg. Co., Milwaukee, Wis., in conjunction with industry representatives, the power ratings of multiple V-belt drives have been revised to provide maximum belt life. Sheave diameters and correction factors are now standardized according to formulas based on results with multiple V-belt drives over a period of ten years. Overload factors are being arranged also to allow for the type of prime mover and driven machine. The new ratings provide in many cases for a more compact drive and also for long belt life at low initial cost.

Companies cooperating in the new standards include: American Pulley Co., Browning Mfg. Co., Inc.; Dayton Rubber Mfg. Co., R. & J. Dick Co., Inc.; Dodge Mfg. Corporation, Fort Worth Steel & Machinery Co., Gates Rubber Co., L. H. Gilmer Co., Goldens' Foundry & Machine Co., B. F.

Goodrich Co., Goodyear Tire & Rubber Co., Inc.; W. A. Jones Foundry & Machine Co., Manhattan Rubber Mfg. Division of Raybestos-Manhattan, Inc.; Medart Co., Plott Foundry & Machine Co., Rockwood Mfg. Co., United States Rubber Co., T. B. Wood's Sons Co. and Worthington Pump & Machinery Corporation.

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American Mining Congress Reelects Young

The mantle of president of the American Mining Congress still rests on Howard I. Young, president, American Zinc, Lead & Smelting Co., St. Louis, Mo., as a result of the action of the directors of the congress at their meeting of Jan. 18 at the Waldorf-Astoria, New York City. At the forty-second meeting of the congress, that preceded naming of the president, the following directors were elected: A. E. Bendelari, director, Eagle-Picher Lead Co., Cincinnati, Ohio; J. B. Warriner, president, Lehigh Navigation Coal Co., Lansford, Pa.; D. D. Moffatt, vice-president, Utah Copper Co., Salt Lake City, Utah; H. L. Pierce, secretary, M. A. Hanna Co., Cleveland, Ohio, and C. H. Segerstrom, president, Nevada-Massachusetts Co., Sonora, Calif. The first and last of these succeed themselves.

Meeting was devoted to secretary's and committees' reports, to discussions of policies of the organization and legislative questions of vital importance. Cleveland Dodge, chairman, resolutions committee, presented for that committee "A Declaration of Policy" covering constitutional government, war and peace, relation of government and business, labor relations, subversive activities, tariff, taxation, Congressional control of expenditures, monetary policy, strategic minerals, Federal inspection of mines, U. S. Bureau of Mines, St. Lawrence waterway and power project, water pollution, and public-land policy.

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Internal Revenue Taxes Climb

During the fiscal year 1939 69,243 internal revenue tax returns were filed by coal producers, according to the annual report of the Commissioner of Internal Revenue. Assessments of tax on operators totaled $3,888,425, and collections amounted to $3,317,259. Returns filed showed an increase of 20,478 over the preceding year, and collections were $105,658 greater.

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Industrial Notes

Allis-Chalmers Mfg. Co. has appointed Fred E. Haker as general manager of purchases. He joined the company 40 years ago as a stenographer.

W. W. Sly Mfg. Co., Cleveland, Ohio, manufacturer of dust-control systems and blast cleaning equipment, has engaged C. W. Barnes to take charge of sales promotion and advertising.

Precision Bearings, Inc., Los Angeles, Calif., has elected Harold Swanton as vice-president to succeed Norman Bell, resigned. Mr. Swanton, who has been sales manager of the company for several years, will continue in that capacity in addition to his new duties.

Worthington Pump & Machinery Corporation, Harrison, N. J., has appointed Harold W. Stoddart as manager of its turbine well pump division. A graduate of Iowa State College, he has been with the company since 1919.

Hercules Powder Co., Wilmington, Del., has appointed A. E. Forster as assistant general manager of its explosives department. A. R. Ely succeeds him as manager of the service division of the explosives department. R. W. McKee has been named as manager of the Birmingham (Ala.) office.

John A. Roebling's Sons Co., Trenton, N. J., has appointed Charles G. Williams as general manager, effective March 1. He was formerly vice-president in charge of purchasing and manufacturing operations for the fifteen plants of the American Chain & Cable Co., Inc.

Roots-Connersville Blower Corporation, Connersville, Ind., has appointed the following territorial representatives: Smith & Berry, Birmingham, Ala., to cover that State with the exception of Mobile. L. W. Oakley, Knoxville, Tenn., will cover that State except for the Memphis area, and also several counties in western North Carolina. Empire Gas & Equipment Co., Denver, Colo., will cover that State and southeastern Wyoming.

Bay City Shovels, Inc., Bay City, Mich., has named the Brinker Supply Co., Pittsburgh, Pa., as exclusive representative in western Pennsylvania and northern West Virginia.

American Chain & Cable Co., Inc., Bridgeport, Conn., has placed C. N. Johns, a vice-president, in charge of operations, vice C. G. Williams, resigned. George C. Moon, also a vice-president, has been appointed general manager of sales. William D. Kirkpatrick, who has been general manager of sales of the American Chain Division, has been elected a vice-president of the parent company.

Portable Lamp & Equipment Co., Pittsburgh, Pa., has placed John Thies, Birmingham, in charge of sales in the Alabama district.

West Virginia Rail Co. has appointed W. F. Robinson, of Huntington, W. Va., as a sales engineer. He was formerly with the Sanford-Day Iron Works, Inc., and previous to that was with the Weir Kilby Corporation.

Electric Storage Battery Co., Philadelphia, Pa., has elected R. C. Norberg, formerly vice-president and general manager, as president. He succeeds John R. Williams, who has retired after being associated with the company for 45 years. Frank T. Kalas has been named third vice-president. He will continue to direct the sales activities of the company.

W. W. Williams, general manager, Babcock & Wilcox Tube Co., Beaver Falls, Pa., will relinquish that position as of March 1 to go into business for himself on

the Pacific Coast. He became associated with the B. & W. organization in 1929 as sales counsellor and became in turn general sales manager and general manager of B.&W. Tube Co.

WILLIAM L. BATT, president, SKF INDUSTRIES, INC., has been elected chairman of the board of the American Management Association. The position had been vacant since the death of James O. McKinsey, chairman, Marshall Field & Co.

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Bernice Tipple to Be Rebuilt

Plans are under way for reconstruction of the tipple at No. 1 mine of the Bernice Anthracite Coal Co., Russellville, Ark. The structure was destroyed by fire of undetermined origin late in December, causing a loss of more than $25,000 and throwing about 200 employees out of work. The company's No. 3 mine was the only one in operation for some time, but destruction of the tipple, which was used in loading, resulted in the closing of this mine also.

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Trade Literature

AJAX-SHALER SHAKER—Ajax Flexible Coupling Co., Westfield, N. Y. Bulletin No. 28 describes Ajax vibrating screens. Bulletin No. 29 covers vibrating conveyors and feeders. Bulletin No. 29 features vibrating packers.

ALLOY TUBES—Babcock & Wilcox Tube Co., Beaver Falls, Pa. Technical Bulletin No. 12-A, "Condensed Technical Data on High-Temperature Steels," contains revised information on seamless alloy tubes and pipes for high-pressure and high-temperature services. Curves and tabulation give analysis, applications, minimum physical properties, creep strength, short-time tensile strength, oxidation resistance, corrosion resistance, temper embrittlement, working qualities, and approximate relative cost for fifteen different materials.

BALL BEARINGS—New Departure, Division General Motors Sales Corporation, Bristol, Conn. Booklet R-26 is the 1940 edition of New Departure's ball-bearing interchangeability tables, which is available on request.

CONTINUOUS WELDED RAIL—Air Reduction Sales Co., New York City. Folder ADG-1069 discusses Airco methods of preparing jointless track for mine-car haulage. Three methods used in the butt welding of rail are described: bronze welding by the oxy-acetylene process, steel welding by the oxy-acetylene process, and steel welding by the metallic arc process.

CUTTING MACHINES—Andrew C. Campbell Division of American Chain & Cable Co., Inc., Bridgeport, Conn. Catalog No. 302 lists, with solutions, unusual cutting problems, with large illustrations of machine set-ups for regular and special jobs, plus concise information, specifications and descriptions.

EARTH MOVING—R. G. LeTourneau, Inc., Peoria, Ill. Folder Form G-1027 tells how, according to the company, the LeTourneau method—'dozers, rooters, cranes and carry-alls—cuts surface mining costs. Job photographs and data on coal, mineral and metal mines are included.

ELECTRIC HEAT—General Electric Co., Schenectady, N. Y. Bulletin GES-2377 points out how electric heat helps step up production in various industries.

ELECTRICAL APPARATUS — Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. Catalog 30-000 is a "quick selector" brochure designed to help in selecting the right equipment for a motor or lighting circuit.

ELECTRICAL EQUIPMENT—General Electric Co., Schenectady, N. Y., has issued the following bulletins: GEA-246F, high-speed synchronous motors, "7500 series"; GEA-1993F, inclosed indicating and drop-out fuse cutouts; GEA-2022C, Diactor generator-voltage regulators; GEA-3248, new d.c. magnetic starter, CR4052; GEA-3250, new smaller magnetic starter; GEA-3259, new magnetic contactors for battery-vehicle control; GEA-3280, cable digest (low-voltage cable); GEA-3339, time switches, Type T-27.

ENGINE-DRIVEN WELDER—Lincoln Electric Co., Cleveland, Ohio. Welder Specification Bulletin No. 336 carries description, specifications and illustrations of the 200-amp. Shield-Arc Junior welder.

FLEXIBLE COUPLINGS—Farrell-Birmingham Co., Inc., Ansonia, Conn. Catalog No. 443 explains the function of flexible couplings, describing how they compensate for parallel or angular misalignment or a combination of both and illustrating details of design and construction. Applications, ratings,

dimensions and weights of various types also are given.

GAS CUTTING MACHINE—Air Reduction Sales Co., New York City. Bulletin Form ADC-623 describes the Airco No. 10 Planograph, designed for cutting straight lines, rectangles, circles and irregular shapes from ferrous metal of any thickness within the present practical limits of the cutting torch. Operating details and specifications are given.

GAS ENGINES—Worthington Pump & Machinery Corporation, Harrison, N. J. Bulletin S-550-B15 describes the Type EEG vertical four-cycle totally inclosed unit, giving complete specifications and engineering data.

INSULATION—General Electric Co., Schenectady, N. Y. Bulletin GEA-3330 enumerates features of G-E induction-motor insulation.

MAGNETS—Dings Magnetic Separator Co., Milwaukee, Wis. *The Magnet*, a house organ, shows some of the manifold uses of these units in industry.

MATERIALS HANDLING—Robins Conveying Belt Co., New York City, Bulletin 109 describes and pictures modern equipment to unload, feed, convey, elevate, crush, size, distribute, reclaim and load a variety of materials, including coal, coke and ashes.

MATERIALS HANDLING—Cleveland Crane & Engineering Co., Wickliffe, Ohio. Bulletin Form G-237 tells how to plan a materials handling system to make the original lift and carry operation complete, eliminate rehandling, increase the size of unit loads in processing, lessen non-productive time of machine runs, avoid waste and damage to products, and conserve human effort.

PAINT—New Jersey Zinc Co., New York City. "Paint Progress," 8-page bulletin, gives intimate glimpses into paint research carried on by the company, together with data on the value of paint as fire protection and service records of paints for water tanks.

PORTABLE ELECTRIC TOOLS—Black & Decker Mfg. Co., Towson, Md. New 1940 catalog covers the company's entire line of portable electric tools. Special attention is called to two improved drills: the ¼-in. Junior, the over-all length and weight of which have been reduced, and the ½-in. Junior, which has been similarly lightened and slenderized.

POWER GRADERS—Austin-Western Road Machinery Co., Aurora, Ill. Catalog AD1888 shows in word and picture the many uses for the "99" power grader, stressing salient features and advantages.

PUMPING EQUIPMENT—Worthington Pump & Machinery Corporation, Harrison, N. J., has issued the following bulletins: W-321-B14, and W-322-B1D, balanced monobloc centrifugal pumps; H-450-B29, turbine well pumps, Type QDO; H-450-B30, vacuum molded impellers for turbine well pumps.

PYRANOL CAPACITORS—General Electric Co., Schenectady, N. Y. Bulletin GEA-3225 describes a complete line of units for power-factor improvement, including diagrams and tabular data.

REPAINTING TRANSFORMERS—General Electric Co., Schenectady, N. Y. Bulletin GET-677B gives instructions for repainting transformers in the field, details covered including surface preparation, method of applying paint, number of coats required, materials recommended, and repainting underground equipment.

SAFETY GOGGLES—American Optical Co., Southbridge, Mass. Bulletin explains recent improvements in Ful-Vue safety goggles to assure protection, exact fitting, structural strength and long service.

SCALES—Toledo Scale Co., Toledo, Ohio. Folder Form 2020a shows in numerous illustrations some of the "45,000 Ways to Weigh" with Toledo equipment.

SPRAY PAINTING—Binks Mfg. Co., Chicago. Catalog No. 75 is designed to give the answers to everyday finishing problems, reports new developments in spray-painting equipment, gives prices, and provides engineering and performance data on all types of spray guns, spray booths, air compressors, painting outfits, extractors, respirators, and hose.

THERMAL INSULATION—Ehret Magnesia

Mfg. Co., Valley Forge, Pa. Manual, divided into sections, contains the following: technical information on insulations; heat insulations; cold insulations; insulation accessories and fireproofing materials; presealed insulated pipe and presealed pipe-line protection; insulation recommendations; refractory cements; packings; building insulations and materials; asbestos fibers and textiles; useful data.

V-Belt Drives—B. F. Goodrich Co., Akron, Ohio. Catalog Section 2180 explains the problems of selecting a V-drive, using stock belts, in terms so understandable that a purchaser or operator without professionl engineering training can comprehend them. Nine separate steps by which the selection may be made are described, and with each step an example is given. Then comes a discussion of V-belt practice, including take-up, slack-off, tension, idlers, effect of oil, fumes, gases, moisture, dust and temperature; guards or shields, use of belt dressing, storage, riding position of belt, etc.

Weld Recorder—General Electric Co., Schenectady, N. Y. Bulletin GEA-3313 stresses the advantages and reliability of the G-E CR7503-G unit, for which the following characteristics are claimed: records the character of the electrical input for every weld, as compared with allowable limits; records, gives an audible signal, and locks out the welder when the input varies more than the allowable limits for satisfactory results; prevents subsequent welding until a pushbutton is pressed.

Wire Rope—Macwhyte Co., Kenosha, Wis. Bulletin describes and pictures Monel wire rope in a variety of services, meeting unusual requirements and conditions.

Wood Preservation—American Lumber & Treating Co., Chicago. Catalog describes and pictures various industries in which Wolman salts preservative is used. Included are mine timbers, where important reasons advanced for its use are cleanliness, freedom from odor and exudation, and reduced fire hazard.

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Accident Fatality Rate Lower For Soft Coal: Up for Hard

Accidents at coal mines of the United States caused the deaths of 70 bituminous and 16 anthracite miners in December last, according to reports furnished the U. S. Bureau of Mines by State mine inspectors. With a production of 37,823,000 tons, the accident death rate among bituminous miners was 1.85 per million tons, compared with 2.49 in the corresponding month of 1938.

The anthracite fatality rate in December last was 4.14, based on an output of 3,862,000 tons, against 3.75 in December of the preceding year.

For the two industries combined, the death rate from accidents in December last was 2.06, compared with 2.63 a year earlier.

Fatalities during December last, by causes and States, as well as comparable rates for 1938 and 1939, are shown below:

UNITED STATES COAL-MINE FATALITIES IN DECEMBER, 1939, BY CAUSES AND STATES

State	Underground									Open-cut and Surface			
	Falls of Roof	Falls of Face	Haulage	Gas or Dust Explosions	Explosives	Electricity	Machinery	Other Causes	Total Underground	Railway Cars	Other Causes	Total Surface	Grand Total
Alabama	5	1	1	....	....	....	....	....	7	....	....	....	7
Colorado	3	....	....	1	....	....	....	....	4	....	....	....	4
Illinois	6	1	2	....	....	1	....	....	10	....	....	....	10
Indiana	....	....	....	....	....	1	....	....	1	....	....	....	1
Iowa	1	....	1	....	....	....	....	....	2	....	....	....	2
Kansas	....	....	....	....	....	....	....	....	....	1	1	2	2
Kentucky	4	....	2	....	....	....	....	1	7	....	....	....	7
Michigan	....	....	....	....	1	....	....	....	1	....	....	....	1
Ohio	....	....	1	....	....	1	1	....	3	....	....	....	3
Pennsylvania (bit.)	3	....	1	....	....	....	....	....	4	....	....	....	4
Tennessee	1	....	....	....	....	....	....	....	1	....	....	....	1
Utah	....	....	1	....	....	....	....	....	1	....	....	....	1
Virginia	1	....	....	....	1	....	1	....	3	....	....	....	3
West Virginia	15	....	4	....	....	2	1	1	23	1	....	1	24
Wyoming	....	....	1	....	....	....	....	....	1	....	....	....	1
Total (bituminous)	39	2	14	1	2	5	3	2	68	1	1	2	70
Pennsylvania (anthracite)	10	1	2	....	3	....	....	....	16	....	....	....	16
Grand total	49	3	16	1	5	5	3	2	84	1	1	2	86

FATALITIES AND DEATH RATES AT UNITED STATES COAL MINES, BY CAUSES*

January-December, 1938 and 1939

Cause	Bituminous				Anthracite				Total			
	Number killed		Killed per Million Tons		Number Killed		Killed per Million Tons		Number Killed		Killed per Million Tons	
	1938	1939	1938	1939	1938	1939	1938	1939	1938	1939	1938	1939
Underground:												
Falls of roof and coal	472	525	1.367	1.347	128	129	2.774	2.580	600	654	1.532	1.487
Haulage	142	161	.411	.413	23	30	.499	.600	165	191	.422	.434
Gas or dust explosions:												
Local	24	17	.069	.044	2	3	.043	.060	26	20	.066	.045
Major	60	28	.174	.072	18	...	.390	.....	78	28	.199	.064
Explosives	23	12	.067	.031	11	15	.238	.300	34	27	.087	.061
Electricity	38	52	.110	.133	2	2	.043	.040	40	54	.102	.123
Machinery	27	28	.078	.072	....	....	....	....	27	28	.069	.064
Shaft	9	5	.026	.013	3	7	.065	.140	12	12	.031	.027
Miscellaneous	26	21	.075	.054	17	10	.369	.200	43	31	.110	.071
Stripping or open-cut	18	7	.052	.018	10	7	.217	.140	28	14	.071	.032
Surface	39	34	.113	.087	11	13	.238	.260	50	47	.128	.107
Grand total	878	890	2.542	2.284	225	216	4.876	4.320	1.103	1.106	2.817	2.515

* All figures subject to revision.